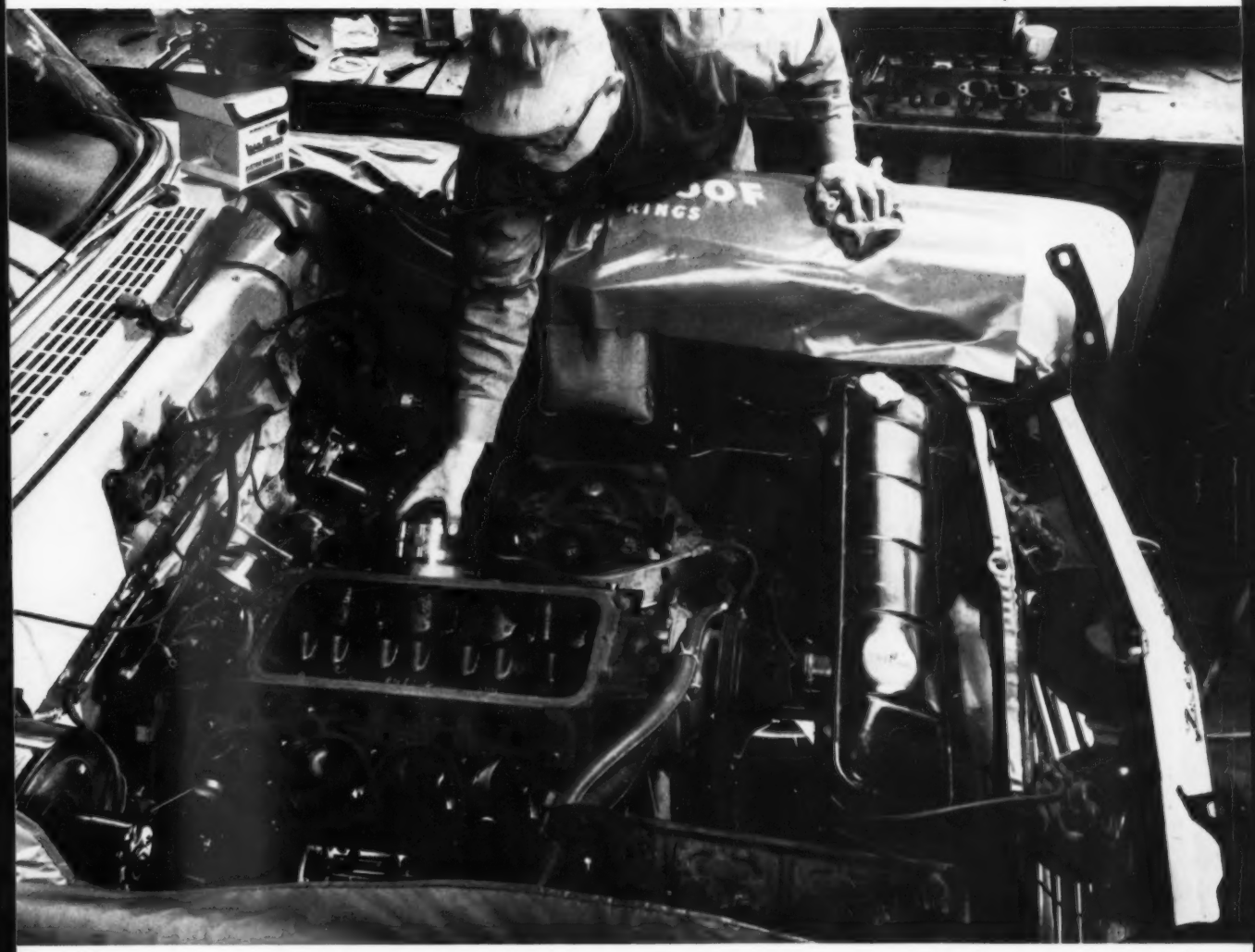
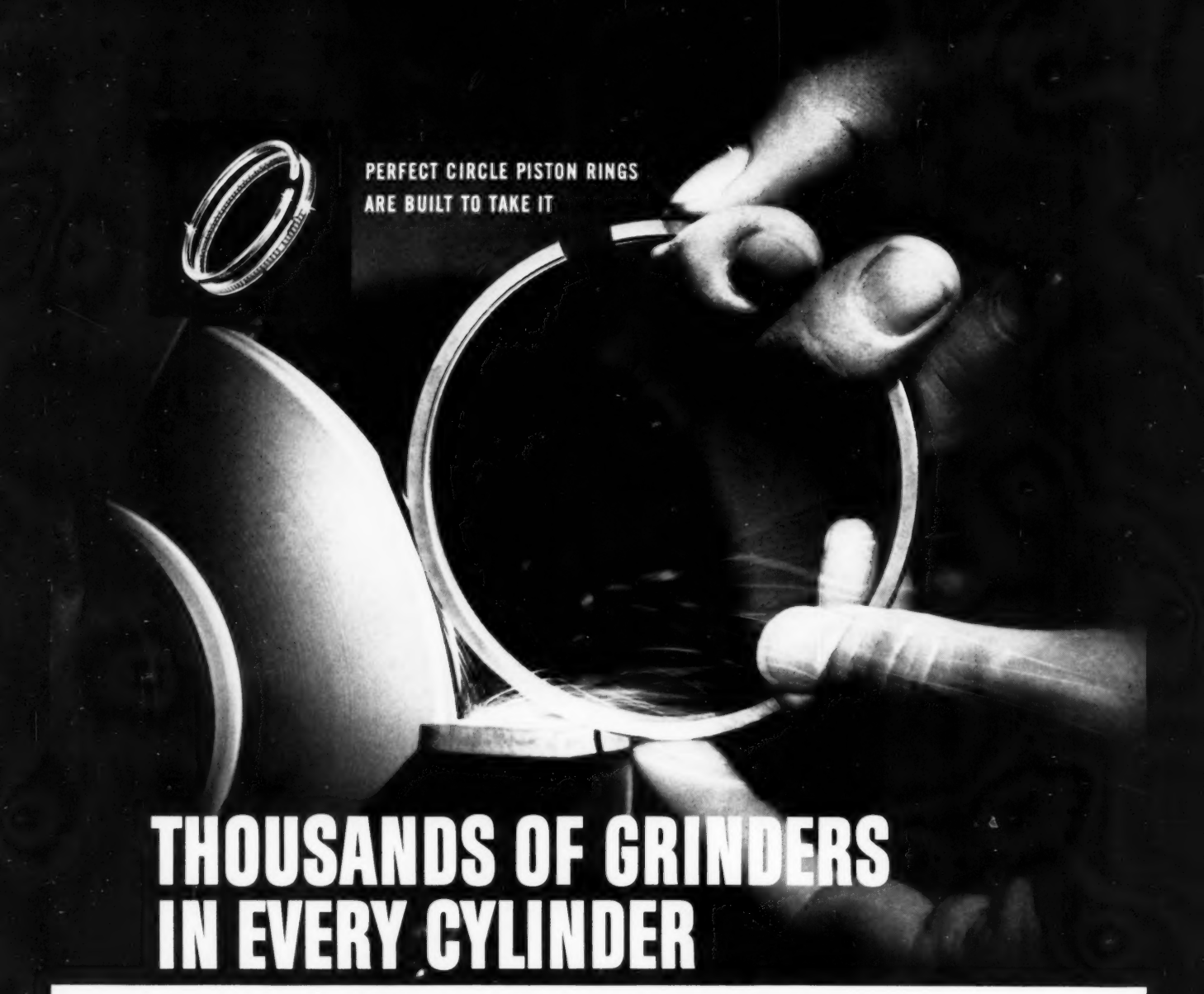
Automotive Service Digest

Our 48th year

June, 1960



Running rings around the bore—See page 14.



THOUSANDS OF GRINDERS IN EVERY CYLINDER

Dirt particles in a cylinder act just like tiny grinding wheels to wear away the face of a piston ring. To protect against this abrasive wear, Perfect Circle 2-in-1 rings are plated with solid chrome—the hardest, longest-wearing surface you can buy.

As a result, wear is reduced an average of 75% over non-plated rings. And, Perfect Circle's chrome plating is 25% thicker than the average of competitive plated rings to provide extra protection and extra life.

In every way, Perfect Circle rings are built to take it. Insist on Perfect Circles—first choice of leading engine manufacturers and mechanics everywhere.

PERFECT CIRCLE

PISTON RINGS · PRECISION CASTINGS · POWER SERVICE PRODUCTS · SPEEDOSTAT

HAGERSTOWN, INDIANA • DON MILLS, ONTARIO, CANADA

News from the Chemical Workbench

SERVICE INFORMATION FOR THE PROFESSIONAL FROM PERMATEX

NEW 3-Ounce Size SOLVO-RUST Sets Up to Make "Silent Salesman" Display

Here's a product made to sell . . . right off the counter . . . right out of the carton. 3 ounces of pure power! Just a few drops will free frozen or rusted parts in seconds.

WHO Needs It?

Everybody. Maintenance men, servicemen, mechanics, plumbers, hobbyists, hunters . . . even YOU need this handy size.

HOW Does It Work?

Powerful penetrant is safe to use on all metals . . . has detergent qualities which spread fast. Dispersed graphite lubricates.

What Does It Cost?

In display carton your cost is 22¢ each; you sell it for 35¢. And don't forget SOLVO-RUST in the larger sizes for your own use.

PERMATEX Valve Grinding Compound Great For Lawn Mowers

Perhaps you have a lawn mower to fix. Make yourself some extra money by selling a tube of Permatex Valve Grinding Compound. It does a neat job of sharpening dull reel-type lawn mower blades. Just dab a little bit on, reverse the pawls so that lawn mower rotates in opposite direction, and presto! The blade is sharp. Try it on your own lawn mower. And you'll probably find uses for it in your own shop—even to sharpening your own tools! It comes in a handy tube, and it costs you 26¢ in units of one dozen —and you sell it for 45¢!

Short Cuts to Engine Repair with PERMATEX Cold Parts Cleaner

Throw away that bucket of kerosene or gasoline you've been using to clean engine parts. In the long run it's cheaper to use Permatex Cold Parts Cleaner. It does the job better. The handy bench-size 1½-gallon size comes complete with dipping basket. Just put the part you want to clean in the basket, lower into the can,

let stand, take it out—presto, the part comes clean! Permatex CPC is great for carburetors, gear assemblies — anything on the engine you need to clean. You can get it in 6-gallon drums, with or without dipping basket, and it will prove a time-saver in your daily operations. Permatex CPC is great for cleaning those greasy tools of yours, too.

Mechanics tell us that the newest addition to the Permatex line, Permatex Degreaser-Cleaner is one of the handiest products on the market today. And it's a perfect partner to Permatex Cold Parts Cleaner.

HELPING YOU—THE PROFESSIONAL—SELL

Permatex provides you with the promotional tools you need to sell Permatex Chemical Products. For instance, there's a new all-products wall-chart available that gives you the full line of products, where to use them, and the prices. Your Permatex Supplier has a copy for you. Also, available is a special sealants-application chart. There are other promotional items — check your supplier—or write us direct.

More Tips on FORM-A-GASKET®

1. Water Pump Seal. Apply a thin coat of Form-A-Gasket® No. 2 to both sides of the flange gasket to make a positive seal. Stops anti-freeze leakage.
2. For Vapor Lock Trouble. Coat the fuel pump and lines with Form-A-Gasket No. 2. It forms an effective insulation barrier at the hot spots.
3. Installing New Muffler. Apply Aviation Form-A-Gasket No. 3 to ends of exhaust pipe and tail pipe to make an easy, tight assembly.
4. Automatic Transmission Fluid Leaks. Apply Permatex Super "300" to both sides of torque converter gaskets and around other parts causing trouble.
5. Clutch Housing Oil Leak. Form-A-Gasket® No. 2 applied to bolt or stud threads will stop leakage through flywheel mounting bolts.

Convenience with PERMATEX

Permatex Form-A-Gasket® comes with special spreader caps. Applicator guns to be used with cartridge cans are available. Ask your supplier for the sizes and products that offer these convenient ways to apply Form-A-Gasket.®

Car Care Dividends FOR DEALERS

Car manufacturers recommend a regular wash and wax procedure in their owner manuals — it keeps the resale value of the car higher. That's why you should tie-in an outside Car Care special whenever you have a lube or tune-up special. Usually with a lube or tuneup it means the car is around your station a good part of the day—so you have the opportunity to wash, clean and wax the car.

Simplify The Job

Permatex makes a complete line of Polishes and Cleaners that are easy to use and meet every need: Perma-Lustre — cleaner-polish for enamel and lacquer body finishes; Chromium Polish—cleans and protects chrome parts; Fabric Cleaner — for all stains, spots and soiled areas. Removes tar, lipstick, gum, grease; Blue-Blazes®— removes dirt, grime from finishes. Leaves long-lasting silicone wax coating; Car Wash — powerful detergent action. Won't streak or hurt finish; Windshield Cleaner Concentrate — for automotive windshield washer reservoirs and spray bottles; Acrylic Cleaner and Polish—use on all acrylic finishes. Tar Remover — removes all tars, gums; safe for all acrylics.

Try It And See For Yourself

Order the Permatex Polishes and Cleaners you need. Check first hand how well this idea works.

Do you have a service tip on a Permatex Product? You will get $5 when it's published in "News from the Chemical Work Bench." Send it to:

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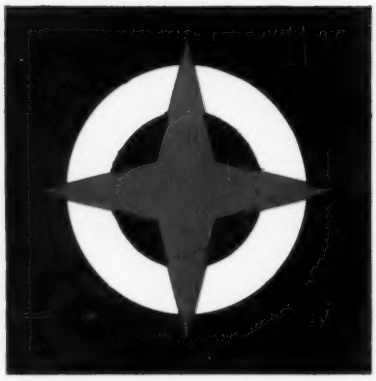
Factories: Brooklyn 35, N. Y. Kansas City 15, Kan.



AUTOLITE SPARKED MORE THAN MOBILGAS ECONOMY ALL OTHER SPARK

4 of 6 first place class winners . . . 5 of 6 second place winners . . .

2 of 5 third place winners . . . 11 of 17 top positions . . . swept by

cars equipped with Autolite Power Tip Spark Plugs.

RUGGED TEST SUPERVISED BY IMPARTIAL ORGANIZATION
The Mobilgas Economy Run, sponsored annually by Mobil Oil Company, is rigidly supervised by observers provided by the United States Auto Club.

Now! Autolite sponsors the election news with Dave Garroway on NBC-TV TODAY Show—and "News on the Hour," NBC Radio.

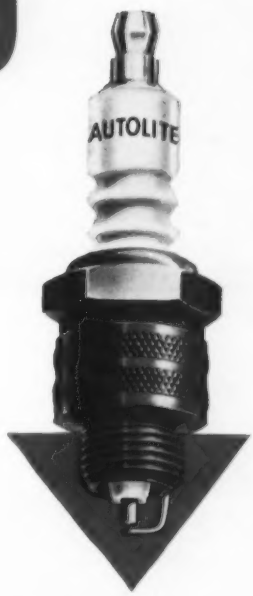
SPARK PLUGS TWICE AS MANY RUN WINNERS AS PLUGS COMBINED

A near clean sweep for Autolite Spark Plug equipped cars was registered in the 2,061-mile Mobilgas Economy Run between Los Angeles and Minneapolis.

Here's proof positive: Under all driving conditions, and in all makes of cars, in slow-speed traffic or at high speeds over the road, miles high in the Rockies or across desert floors—one spark plug stands out over all others—AUTOLITE.

PROOF POSITIVE: YOU'RE ALWAYS RIGHT WITH AUTOLITE. To sell the plug that sparks more winners, check your Autolite Spark Plug source of supply . . . today.

THE ELECTRIC AUTOLITE COMPANY • TOLEDO 1, OHIO



AUTOLITE® SPARK PLUGS

IGNITION ENGINEERED FOR ALL CARS

Sealed Power has *Stainless Steel* ...the very best oil ring metal ever used!

STAINLESS STEEL OIL RING, U. S. PAT. NO. 2,789,872

Preferred Performance

* Stainless steel resists corrosion—makes it virtually impossible for troublesome sludge and carbon deposits to build up. Overcomes oil ring plugging—oil pumping.
* Stainless steel maintains its original, built-in tension indefinitely so it delivers better oil control far longer than ordinary rings.

The high number of spring tension points assures oil control in tapered and out-of-round bores.

Side seals in groove—stops oil going around back of ring—no smoking.

End-abutment design produces ring tension independently of contact with bottom of piston groove—eliminates groove depth problems.

Chrome-plated, factory-seated side rails give instant oil control. Sealed Power Corporation, Muskegon, Michigan.

Sealed Power KROMEX PISTON RING SETS

PISTONS • • PINS • • SLEEVES AND SLEEVE ASSEMBLIES • • VALVES • • WATER PUMPS • • TAPPETS

VOLUME XXXXVIII
No. 581

June 1960

Automotive Service Digest

Cover Subject

Maintaining a good seal between the cylinder wall and piston under punishing heat and combustion chamber pressure calls for correct ring selection and, equally important, the best of craftsmanship in installation. (Photo, courtesy McQuay-Norris.)

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Technical help for the service shop

Tech Know-How **articles cover how-to and what's new in approved, up-to-date shop practices, as seen and understood by men experienced in the trade.** ***Business Know-How,*** **the dollar-sign side of automotive service work;** ***Service Education,*** **the who-what-where-how of today's trade training.**

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Automotive clinic

Stuck on some problem? Need help on a job? Write us about your problem on your SHOP LETTERHEAD to insure receiving the information you are looking for. The Automotive Clinic is exclusively conducted for shop operators and others actively in the automotive service business.

Address your letter to Automotive Clinic c/o AUTOMOTIVE SERVICE DIGEST, 900 So. Wabash Ave., Chicago 5, Ill.

Ben Ikert, Editor

Rough Engine Idle

What would you suggest I do to get a 1955 Dodge V-8 engine to idle more smoothly? Our shop has a customer with one of these cars and try as we will, we don't seem able to satisfy, not only the owner of the car, but ourselves as well. I might say we have tried just about everything, but still no cure.—*L.O.H., Gainesville, Ga.*

Answer: As long as you say that you have tried just about everything, perhaps one more suggestion on our part is in order. You may have better luck if you will adjust the carburetor idle with the transmission lever in "D" (drive position). You will find that the engine will idle much more smoothly. Then, put the lever in "N" and adjust the speed slightly faster than the factory specifications. Also, make sure that the spark plugs are in good condition, gapped correctly and torqued in to 28 ft. lb. Have the ignition distributor cam dwell in accordance with the factory specs (32 to 36 deg.) and resistance of the contact breaker points within limits. Resistance in the ignition circuit should not be more than 0.2 volt.

U-Joint Grease Fittings

Is there any reason why grease fittings could not be installed on the universals of '57 Olds and Pontiacs? I figure the fittings could be installed in the bearing caps of these joints, which use the cross and yoke type. It seems to me that by drilling a hole in the bearing cap, in line with the grease reservoir, in the journal of the cross, the car owner could have the U-joints greased at the same time the car was being serviced with a lubrication job. This would eliminate driving the joints apart to repack them. I presume a ball check valve type fitting could be used so as to keep grease from leaking. What are the advantages or disadvantages of this idea?

—*P.J.B., Colorado Springs, Col.*

Answer: There are several drawbacks to your idea of putting grease fittings on the universal joints, which, after all could easily be done by the manufacturers, were the idea practical. You must remember that the weight of the grease fittings can throw the entire driveshaft out of balance. This could cause very objectionable vibration at high car speed.

Another reason why the idea is not practical is the fact that putting grease in the joints under heavy pressure of the grease gun, is very likely to blow the grease seals out of the U-joints.

Valiant Brakes

Another mechanic and I were recently told by a jobber's representative that you have to take certain precautions in adjusting the master cylinder push rod of the Valiant car. Is this true, and what is it that we have to watch out for?

—*J.W., St. Louis, Mo.*

Answer: You're right. In servicing the brakes of this car, one of the most important things is the correct adjustment of the master cylinder push rod. Unless the push rod has been replaced, it will not be necessary to adjust it. The self-locking screw on the end of the push rod is set to the correct height at the factory during manufacture. But, should it become necessary to replace the push rod, you have to make an adjustment. To do it, you hold the push rod seated against the reaction disc, and center it in the spring of the cylinder. Be sure the piston assembly is free in the cylinder and firmly seated in the released position. Using a special gauge for the purpose, adjust the self-locking screw so that the head of the screw is 1.195 in. to 1.200 in. from the face on the vacuum cylinder. This is a critical adjustment and must be within the specifications given.

WHEN CHANGING YOUR ADDRESS

Please notify us 5 weeks in advance. Supply us with both your old and new address, including address label from current issue if possible. Copies we mail to your old address will not be delivered by the Post Office unless you pay them extra postage. Mail address changes to Circulation Dept., Automotive Service Digest, 900 South Wabash Ave., Chicago 5, Ill.

More on Reverse Polarity

Readers will recall the article "The Perils of Reverse Polarity" which appeared in the October 1959 issue of ASD and the ensuing discussions by ignition experts in the clinic of the April 1960 issue. The latter appeared under the title of "Voltage Wave Form With Standard and Resistor Spark Plugs."

Now, along comes a manufacturer of electrical testing equipment to add coal to the fire in this round table discussion. We are indebted to James Umbarger, President of Fox Valley Electric Corp., Cheboygan, Mich., for the following clinic contribution.

Your articles in Automotive Service Digest, particularly those articles pertaining to spark polarity, are very interesting. The great importance of the automotive ignition system is well established and so are the methods employed to produce the sparks. In view of the fact that there has been no significant change in automotive ignition systems in over two generations, it is interesting to note that even the experts do not yet agree on the nature of an ignition spark. It is gratifying to read your articles on this subject which has been too long neglected by most of us. Having been intimately concerned with such matters for many years, and having made many observations, I have drawn some conclusions that might interest your readers.

To be specific, and no doubt controversial, I wish to state that all normal ignition spark current is D.C. or direct current. It does not alternate or reverse its direction, even to the slightest degree. The current all goes in one direction. This is true regardless of whether resistor plugs or resistance type ignition wires are used.

(Continued on page 75)

AC **SELLING *SLANT* OF THE MONTH!**

MONEY-MAKING FACTS FOR DEALERS

capture bigger profit$ with the NEW AC CAP CABINET & ASSORTMENT

This attractive cap cabinet is yours at no cost—when you purchase the cap assortment! That's right. All you buy is 29 radiator caps and 14 gasoline caps in this fast-moving assortment at the usual price—and this attractive cabinet is yours. This sturdy, all-metal cabinet provides display space on the cover for 1 gas tank cap and 1 radiator cap. You can use it as an attention-getting counter display—or mount it on your lube bay wall. Its spacious interior accommodates the full cap assortment, plus your present cap stock—with a special compartment for your cap tester or hydrometer. Here's the ideal way to keep your complete cap inventory in a convenient spot—and build cap sales, too!

Your cap assortment fills the bill for over 9 out of 10 customers. This fast-moving assortment covers practically all requirements. The 29 radiator caps in the assortment cover 96% of all pressure cap applications; the 14 gasoline caps, 90%. This can't help but add to your profits.

A handy specification chart is also included—located inside the cabinet cover, handy and protected from dirt. This up-to-date chart will help you find the right cap for all applications.

FAST TURNOVER—FAST PROFITS

Dealer cost for the assortment of 29 AC radiator caps and 14 gasoline caps is only $29.85—the all-metal cabinet comes at no charge. With a suggested retail value of $49.85—you can make a whopping $20.00 profit on an investment of only $29.85.

suggested retail value	**$49.85**
your cost	**29.85**
your profit	**$20.00**

ORDER YOUR CAP CABINET AND ASSORTMENT CA-1 NOW!

AC SELLING SLANTS

MONEY-MAKING FACTS

Give the little lady offered with AC's new

AC's newest, value-packed FUEL PUMP PROMOTION is your call to fuel pump sales action and profit—and the immediate ownership of a brand-new, fully automatic PRESTO FRY PAN, PRESTO CONTROL MASTER and PRESTO RECIPE BOOK!

PRESTO FRY PAN

Big 11-inch model will give your wife plenty of room to easily and assuredly prepare perfect meals every time she uses it! Fully automatic! Ends scorching and burning! Can be submerged in water for quick, easy washing! A gift she'll treasure for many, many years!

PRESTO CONTROL MASTER

Actually puts an electric range in the palm of her hand—by operating eight different Presto appliances to perfection. Easily attaches to her new Fry Pan to assure completely accurate control of heat. Features large, easy-to-operate temperature selector dial. The seven other appliances are available through your local Presto dealer.

PRESTO RECIPE BOOK

Eighty pages that take your wife through carefully prepared recipes for delicious food specialties. In addition are instructions on the care and use of her new Presto Fry Pan and Control Master Unit. She'll find a new joy in cooking—the Presto way!

USE THIS PROMOTION TO STIMULATE EMPLOYEE SALES ACTION!

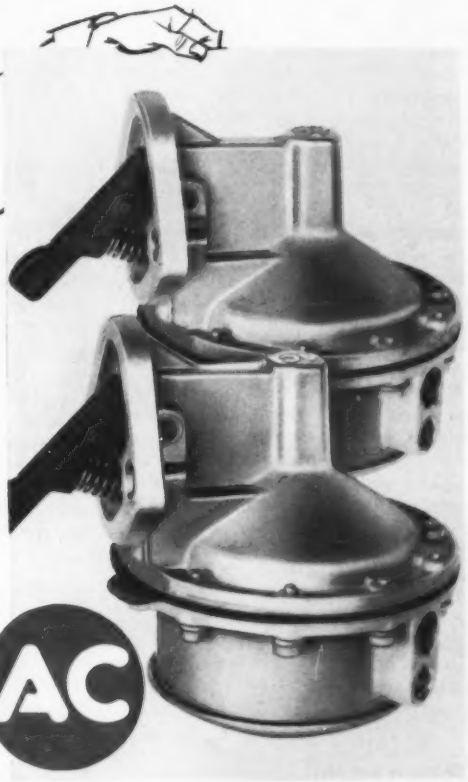
The Presto Fry Pan and Control Master Unit makes a perfect prize for an employee Fuel Pump Sales Contest.

Offer them as the reward to your service men selling eight AC Fuel Pumps during this big profit-making program.

OF THE MONTH !

FOR DEALERS

this automatic Fry Pan Fuel Pump Promotion !



FIRST—order any 6 fast-moving, profit-making AC Fuel Pumps of your choice—and include only an additional $17.40 for the promotion package.

SECOND—you'll receive the new AC Promotion Package that includes:

- Big 11" Presto Fry Pan
- Presto Control Master Unit
- Eighty-Page Presto Recipe Book
- Two AC Fuel Pumps (#4460, Single Action, Chevrolet V-8, 1955-57) worth $17.40.

THIRD—by selling the two fast-moving AC Fuel Pumps included in the package, you automatically recover $17.40. Thus, your profit from the sale of the two pumps pays for the promotion package. The Presto Fry Pan, Control Master Unit and Recipe Book offer years of "dining at the Ritz"—at home!

AC SPARK PLUG ⚛ THE ELECTRONICS DIVISION OF GENERAL MOTORS

ORDER YOUR FPM-69 FUEL PUMP PROMOTION PACKAGE—NOW!

By J. EDWARD SCHIPPER
Detroit Editor

Spokes from the "hub"

● INTEREST IN transistorized electrical systems continues to grow throughout the industry. General Motors' Delco-Remy Division and Autolite are two of the most enthusiastic proponents. Right now the merits of the transistor system as against the usual coil and breaker has become simply a matter of extra cost.

H. G. Riggs, Director of Sales and Engineering for Delco-Remy, says, "the arrival of this type of ignition will depend on the extent to which car manufacturers increase electrical loads and engine compression ratios and the willingness of car owners to pay for the advantages."

Riggs claims that the transistor system "just about eliminates electrical troubles by doing away with erosion of the ignition breaker points, and provides greater spark plug life. Furthermore, the high voltages provided by transistorized ignition would improve cold-weather starting with reduced drain on batteries."

The germanium transistor now in use may be superseded by such devices as cold Cathode Thyratron tubes. These would overcome the limitations of the germanium transistor in its voltage handling capacity.

* * *

There is a growing use in special applications for alternators in place of generators. The difference between the two, of course, is in the method of current rectification. The direct-current generator, used almost universally, has a built-in mechanical regulator, while on the alternator, rectifying the current is accomplished electronically. The Delco-Remy unit rectifies with six silicon diodes. The system has the ability to generate sufficient output even at practically idling speeds to supply the requirements of a car loaded with accessories such as air conditioning, etc. It is already in use for certain applications for trucks, buses, farm tractors, police cars, taxis and delivery cars. It is being carefully studied for passenger cars.

* * *

Economy cars will probably account for 35 per cent of the U. S. new car sales after the introduction of four new compacts in the fall, according to Byron J. Nichols, Chrysler Corporation vice president-automotive sales. He also predicts that the number of cars in use—about 58 million—will increase to over 66 million by 1965. In the late 60's, eight-million-car sales years are a definite possibility, he says, and by 1970 we may expect to see over 80 million cars on the road.

* * *

Talking before the National Federation of Financial Analysts Societies recently, G. R. Cuthbertson, vice president United States Rubber Company, stated that since the early days of the automobile the per-mile cost for tires has declined to one-thirtieth of what it was. He points out that in the early times it cost the American motorist more to keep his car in tires than it did to keep it in gasoline. He credits the development of synthetic rubber for one-third of this saving as far as the difference in price of the material itself is concerned. The other two-thirds, he states, reflects the added tread wear which synthetic rubber provides. He figures that there is a savings of a billion dollars a year spread over the 68 million cars in use today, amounting to more than $14 per vehicle. The total, he points out, is more than 3½ times as much as the 262 million dollars spent by the government to build the synthetic rubber industry in the first place.

That wasn't a bad investment by the American public—particularly when you note that the government made a profit on its synthetic rubber operation and then sold the plants to private industry for more than the original cost.

* * *

Chevrolet's newest compact air-cooled car is not its first venture in the waterless engine field, according to Antique Automobile magazine. This magazine, which is the organ of the Antique Automobile Club of America, states the first air-cooled Chevrolet was produced in 1922. This was known as the "copper-cooled car" which is based on the theory that no engines are water-cooled. The water simply transfers the heat from the water jackets to the copper-cooled radiator.

While this car performed fine in its experimental stages, it was disappointing when it reached production with the result that General Motors issued an edict which stated that, "all copper-cooled cars were to be obtained from dealers and customers and destroyed."

One of the two cars that had been secreted away, and not turned in, is owned by the author of the article in Antique Automobile, Henry Austin Clark, Jr. It is on display in the Long Island Automotive Museum at Southampton, L. I.

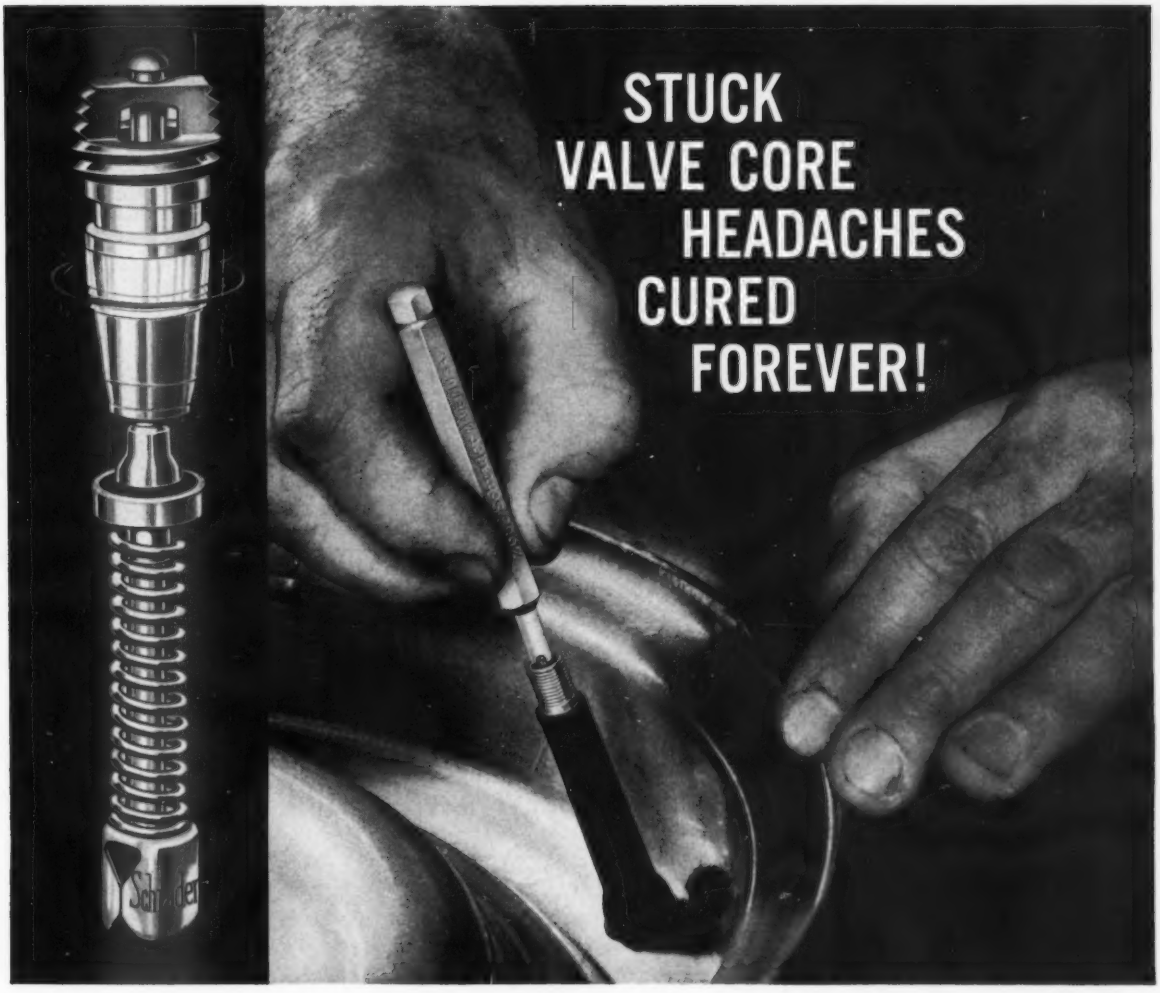
* * *

The appointment of Paul B. Hoffman as parts and service marketing manager for the Lincoln-Mercury Division is announced by Chase Morsey, Jr., general marketing manager for the Division. Mr. Hoffman replaces Dennis A. Kuhn, who has been appointed Dallas district sales manager for Lincoln-Mercury. Hoffman came to Ford Motor Company as assistant director of parts and service in 1945.

* * *

H. E. Humphreys, Jr., newly elected chairman of the National Highways Users Conference, estimates that traffic congestion and delays cost the American public more than six billion dollars each year. He states that, "good roads cost less than the congestion and delays due to traffic inadequacies." He urged renewed national, state and local efforts in safety education and engineering, zoning and highway building to meet the growing

(Continued on page 82)



New Swivel-T Valve Cores come out clean and easy... yet assure the most positive air seal you've ever made

If you haven't taken advantage of Schrader's Swivel-T Valve Cores, you're behind in important daily service. The Swivel-T can't stick! Makes the best seal! Won't ever break off in the valve stem! Assures faster, better service for customers and profits for you.

Look for the white washer. This Swivel-T sealing gasket is made of Teflon*–slipperiest substance known. Its built-in lubrication makes it self-swivelling, and it shrugs off oil, water, acids. Temperatures from −100°F. to 500°F. don't faze it. Slides in and out like magic, leaving valve walls clean.

Yet Schrader Swivel-T Valve Cores cost no more than previous Schrader cores. Your supplier has them in stock. See for yourself how you can make a better seal.

*A duPont Trade Mark

Schrader
a division of **SCOVILL**

A. SCHRADER'S SON • BROOKLYN 38, N. Y.
Division of Scovill Manufacturing Company, Inc.

FIRST NAME IN TIRE VALVES
FOR ORIGINAL EQUIPMENT AND REPLACEMENT

Made in America to American Standards of Quality

TOUGH BUT OH SO... GENTLE

Hastings piston rings are GENTLE on cylinder walls...TOUGH on oil pumping

steel-vent oil — flex-vent oil

In these typical Hastings oil rings, you can see for yourself the ample ventilation that provides efficient drain-back . . . prevents clogging . . . gives lasting oil control.

HERE'S WHY: Hastings Oil Rings have "wide open" spacers—the most ventilated in the entire industry—therefore deliver more oil to the cylinder walls. The narrow contacts of the steel rails assure positive oil control. Result: adequate lubrication, less wear, longer life for cylinder walls, pistons and rings.

Moreover, the Hastings "shell molding" process of making piston ring iron—a brand new, *different* process—gives you compression rings with more free graphite . . . and graphite is a metallic lubricant. It lubricates the cylinders and provides extra lubrication at the top, where the heat is greatest, and there's the least amount of oil.

This extra protection and longer life for cylinder walls and pistons is coupled with Hastings' established reputation for controlling oil—*completely*. Hastings means no more come-backs . . . better profit . . . and satisfied customers from the start.

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HASTINGS

PISTON RINGS

Editor's page

Care of cars on the rise

• STRAWS IN THE WIND portend that the car owners of America are getting more service conscious. Motor vehicle operators are paying more attention to the care of these vehicles—chassis wise and from the standpoint of appearance.

The familiar slogan, "Care Will Save Your Car" coined many years ago is blossoming forth under various guises as to safety, performance and good car keeping.

Apropos are remarks made recently in a report to the American Petroleum Institute's Lubrication Committee by Rudolph Cubicciotti, vice president of Sonneborn Chemical and Refining Corporation. He is of the opinion that the renewed interest in car maintenance on the part of many car owners is due to the following factors:

1—A desire to avoid costly breakdowns, especially since disablement of a car on today's crowded highways often creates a safety hazard.

2—Recognition that a motor car is no longer a luxury, but a means of transportation essential to the owner's livelihood.

3—A desire to obtain maximum performance at the lowest cost in miles per dollar.

4—An increase in the number of drivers in the 18-to-25 year age bracket . . . most of whom have been exposed to good maintenance practices through driver education programs in secondary schools.

5—Greater interest of many motorists in cars as a hobby—a result of the sports car upsurge in recent years. Sports car enthusiasts are, as a rule, more mechanically minded than the average car owner.

In the report it was pointed out that in spite of a definite upturn in the interest of motorists in car care, many are confused when it comes to good and required maintenance practices. Studies showed that motorists often ignore timely advice from car manufacturers, fuel and lubricant suppliers and service mechanics.

So again, need for more intense service selling looms on the horizon. Shopmen know how to line up wheels, how to do a tune-up job, but convincing car owners of the need and selling the work is a matter of good salesmanship.

As Vernon Vollard, executive director of the Good Car Keeping Institute, recently said "the best way to save money on your next car is to be a good car keeper, and through better maintenance, preserve the value of your present car."

With car care on the rise, it might be good to keep this in mind when customers come in.

Ben Ikert
EDITOR

AUTOMOTIVE TECH KNOW-HOW

By HERB CARRIER

Running rings around the bore

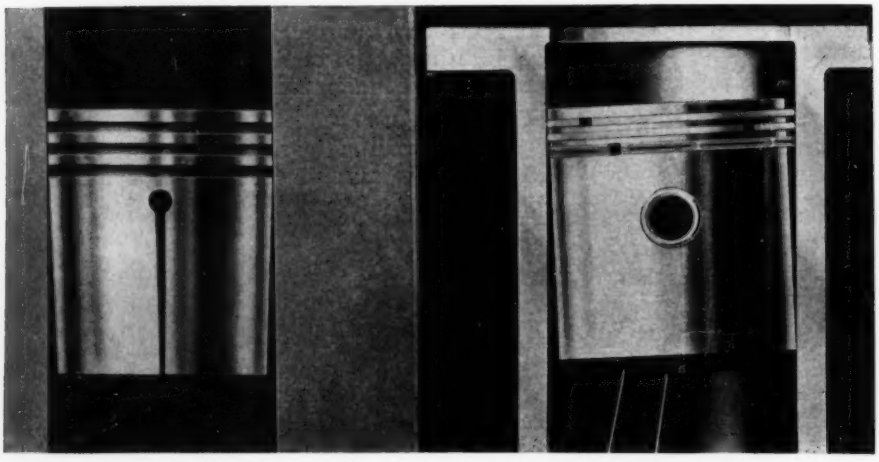
Internal combustion engine performance depends to a great extent on the ability of piston rings to effectively contact cylinder walls. If properly selected, correctly fitted and installed, modern rings will meet this requirement.

• "WHEN TO RE-RING" is a question often asked, but seldom satisfactorily answered. Some mechanics and most car owners usually base their answer to the question on how much oil the engine consumes over a given period of operation. Years ago, this used to be a valid yardstick, but with modern higher-speed, higher-horsepower engines, the amount of oil used by these engines is not necessarily the best indication of the ring condition.

For example, a worn oil control ring can certainly cause excessive oil consumption. But long before the engine turns into a "pumper" because of malfunctioning or worn control rings, a re-ring may have been called for because of excessive "blow-by". Blow-by is a much more important factor to consider when analyzing the condition of the piston rings on a particular engine than is oil pumping. Once an engine pumps oil, all the rings are usually "shot", but a re-ring job was called for earlier. The top ring of an internal combustion engine piston takes the most abuse. It is exposed to the highest temperature, also the most pressure. Therefore, it's reasonable to assume that it will wear first and quickest. It's not too unusual to find excessive wear of the top ring and the ring groove in the piston, yet find the oil control ring on the same piston in near-perfect condition.

With the top ring badly worn, or at least with excessive clearance, blow-by is likely to occur. Strangely enough, blow-by (the escape of combustion gasses past the rings—particularly the top ring) can be an assist to the oil control ring. In many cases, blow-by helps the oil control rings do their work. The "kicker" in this story is that a re-ring job is called for when the top rings start permitting blow-by. Operating the engine with worn or broken top rings is asking for extensive damage and a major repair bill. Re-ringing when the conditions call for it can mean many dollars saved by the car owner, and a better job of engine rebuilding by the service mechanic.

If the car owner, or the service mechanic, waits until signs of excessive oil consumption are visible before requesting or recommending a re-ring job, it's usually too late to avoid paying a heavy penalty in the form of a stiff repair bill necessary to restore



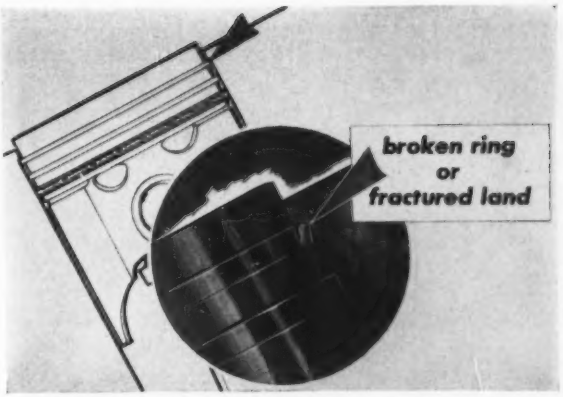
Left, example of collapsed piston skirt which contributes to oil pumping and also causes the piston to rock (right). Rings rock with the piston, rounding off their outer edges so they are unable to scrape oil from upper part of the cylinder. (Courtesy American Hammered Division)

the engine to top efficiency. In virtually every instance, a re-ring job is called for when the top rings lose their recommended working clearances . . . not when the engine becomes an "oil burner".

UNCOVERING NECESSARY RING JOBS

It is estimated that literally hundreds of thousands of motor vehicles are being used every day that are in need of a new set of rings. Unfortunately most car owners—and many mechanics—can't recognize the early signs of ring failure. They wait for an almost complete collapse of the engine cylinder compression before suggesting a re-ring.

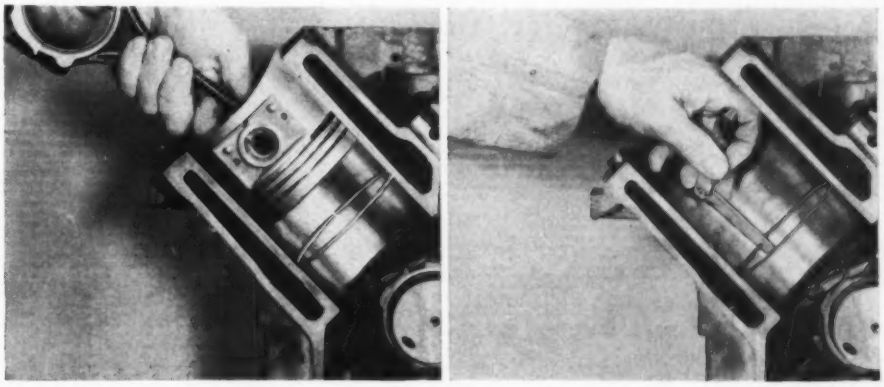
The shop operator interested in increasing the volume of engine work can often fill his shop by learning how to quickly detect and SELL engine work when it is first needed. One of the best ways to do this is to listen to the customer's complaints when he comes in for periodic service. Most customers do the initial detective work by complaining of "poor mileage", "hard starting", "poor acceleration", and so on. These complaints are generally interpreted by the listening mechanic as indicating the engine needs a tune-up. Often it does, but equally as often it requires more comprehensive service work to restore the engine to "like new"



A broken or fractured piston land can result if the ridge that forms at the top of cylinder bore is not removed before piston assembly is removed from engine. The ridge is removed with a reamer. (Courtesy Sealed Power Corp.)

plaints of irregular or poor operation, begin by checking the oil level in the engine crankcase. If the dipstick reveals a low level, and if the customer is between normal oil change periods, you've got your first clue. Something is wrong with the engine, and further checks are called for immediately.

The next step is to have the customer accelerate the engine several times while you are watching the



Left, retracting piston after it has pushed piston ring squarely into unworn portion of the cylinder, so ring end gap can be checked with a feeler gauge (right). (Courtesy McQuay-Norris Mfg. Co.)

performance. Dollars spent tuning up an engine are dollars wasted when the engine is not in mechanical condition to accept a tune-up.

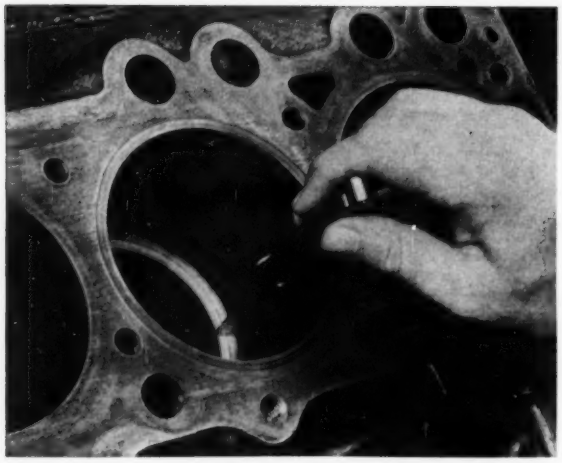
The first step, therefore, is to quickly check-out the complaints to see if a re-ring or a tune-up is called for. Generally, most car owners are reasonable people. They want to keep their cars in good condition, and count on the proficient mechanic for advice in spending their maintenance dollar. Most customers want good service, and are willing to pay for it. They don't want a mechanic to give them a fast tune-up when it fails to give them the benefits for which they paid. Being honest in your appraisals of the work required, then following through with skilled craftsmanship is the best good will builder of any repair situation.

So, in checking out any or all of the above complaints, begin by checking the oil level in the engine crankcase. If the dipstick reveals a low level, and if the customer is between normal oil change periods, you've got your first clue. Something is wrong with the engine, and further checks are called for immediately.

The next step is to have the customer accelerate the engine several times while you are watching the tailpipe outlet. Look carefully for signs of blue smoke upon acceleration and deceleration. If the engine puffs blue smoke at these times, it's a dead giveaway that the engine is pumping oil into the exhaust system. Have the customer stop the engine and feel the inside of the tailpipe. If the pipe is loaded with carbon or moist soot-like material, it's a sign of a mechanical malfunction.

Another barometer of engine condition is the operating efficiency of the windshield wipers, providing, of course, the wiper is vacuum operated. If the wiper action is sluggish, even with the blades and arm removed, it's another sign in favor of a ring job.

If these "external" checks point to engine wear, it's time to take a look inside. To do this, remove the spark plugs and carefully check their firing ends.



Checking the end gap of a piston ring with a feeler of the right thickness is a most important operation in a ring job. (Courtesy Perfect Circle Corp.)

The study of spark plugs involves a little background, but, usually wet sludgy deposits on the firing end of a plug means that the cylinder fired by that plug is using oil. This might be due to worn valve guides or worn piston rings. To further check, take a "dry" compression check. If compression is low on one or more cylinders, add about a teaspoonful of engine oil to the top of the piston in the low-reading cylinder and repeat the compression test. If the compression comes up during this "wet" compression test, it indicates the rings are worn. It could also indicate the cylinder walls are worn excessively. Usually these two conditions run hand-in-glove.

Finally, an over-all check should be made to the exterior of the engine. In instances of an extremely dirty engine, it should first be steam cleaned so that a thorough inspection can be made. Check carefully for any signs of external oil leaks. Check, also, for a cracked diaphragm on a combination vacuum booster fuel pump. A cracked diaphragm can permit engine oil to be pulled from the crankcase to the engine's inlet manifold. A defective booster pump should be replaced with a new or rebuilt pump before any further attempts are made at inspection or correction of engine malfunction.

If, after all the foregoing checks and inspection indicate a re-ring job is necessary, proceed as follows:

RE-RING PROCEDURE

Disassembly: Correct disassembly is vitally important to a good re-ring job. Only through using the recommended disassembly techniques can the mechanic uncover some of the conditions which directly influence engine operation. For example, never tear down a dirty engine. An engine that is coated with dirt, grime, and grease should first be cleaned before being opened up for removal of interior components. It's possible, also, for layers of foreign matter to conceal the conditions you hope to uncover through careful disassembly. It is urgently suggested that engines be thoroughly washed down with shop solvent (preferably steam cleaned) before they are opened to prevent dirt and grease working their way into the highly polished areas inside of the engine.

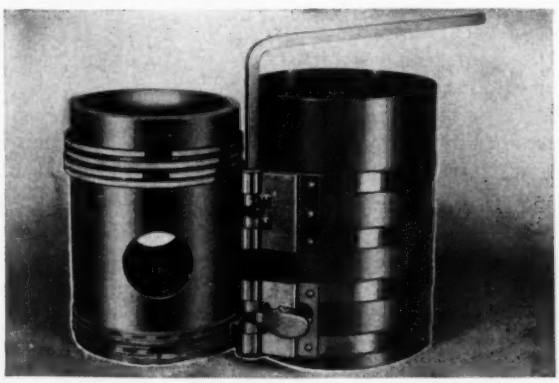
During disassembly, check the cylinder head(s) for damage or warpage as soon as they are removed. The head(s) must be substantially flat (within limits), and not be damaged in any way. If warpage is indicated, the defective head must be surface ground flat before it is re-installed on the cylinder block.

Next, carefully inspect the head gasket(s). Look closely for signs of leakage of compression and/or engine coolant. Note the areas of any leakage and determine its cause before proceeding with further disassembly. Naturally, a gasket is never re-used. Even the slightest bend or kink in modern all-metal gaskets render them unfit for further service.

Once the head(s) and gasket(s) are removed, inspect the tops of the pistons. Look carefully for any signs of "wash" caused by engine oil slipping past the piston rings. Inspect, also, for signs of dampness caused by unburned oil slipping past the valves. The underside of the valves should be checked for signs of excessive carbon deposits. Modern lubricating oils are formulated to markedly reduce this type of deposit, so the problem is not as critical as formerly. The situation can still exist, however, and the valves should be checked during any major service work on the engine.

The next step is to inspect for the ridge that may exist on the cylinder wall. This ridge must be removed with a dependable reamer **before** the pistons are removed. If not, there is danger that the top piston ring will catch on the ridge during piston removal. This can break the ring and/or the piston land. It's also possible to slightly fracture the land and which will not show up until the re-ring job

When all rings have been installed on piston a ring compressor is installed which makes it easy to slip the assembly into the bore. (Courtesy Hastings Mfg. Co.)



has a few hundred miles on it. When this happens, the service mechanic who performed the ring job has a "come back" on his hands.

Once the ridge has been removed properly—not too deep and not too shallow—the pan can be dropped, the rod caps removed and the piston assemblies pushed out of the engine through the top of the bores. Be sure to inspect the connecting rod bearings during removal. Look closely for any signs of pitting, flaking, or burning. Always replace any and all bearings that are at all questionable. It's usually a good idea to replace the connecting rod bearings, and even the main bearings, during a re-ring job. However, it is permissible to re-use the rod bearings **if they are in good condition.**

After the pan has been removed, clean it thoroughly and inspect for any signs of damage. Watch closely for signs of stress cracks that show up only when the engine is completely "buttoned up". These hairline cracks can give no end of trouble because they "disappear" when the pan is removed.

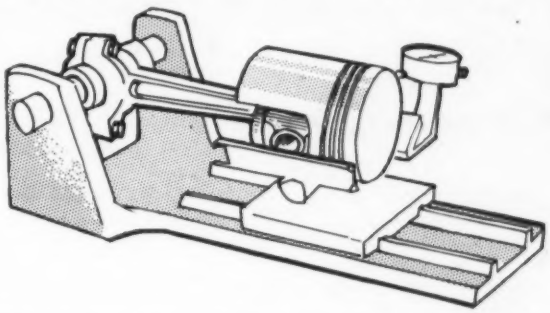
With the pistons removed from the engine, remove all the rings from each piston. Thoroughly clean the pistons, paying particular attention to the ring grooves and lands. Inspect the pistons for excessively worn lands, grooves and skirts. Also check the piston pins and bushings. Make certain, too, that the rods are in alignment. Aligning rods requires a fixture, or alignment jig, but the process is not complicated and can be performed quickly and easily. For the service shop that does not wish

To insure correct operation of rings, it often becomes necessary to recondition the grooves in the piston. (Courtesy Ramsey Corp.)

to get into aligning connecting rods, this service is available through most automotive jobbers. It's an added precaution during re-ring jobs, but it pays off in the long run both for the shop and customer.

A general rule that applies in most all cases, points out that if a piston groove has over .006" clearance between the new piston ring and the edge of the groove, the groove should be remachined by a competent machinist.

Piston grooves can also be restored to their original size through the use of groove inserts. Properly installed, the insert adds many miles of extra life to an apparently worn out piston. Piston skirts should be carefully measured with a dependable micrometer to make sure they haven't worn or collapsed. Knuralizing or shot-peening of piston skirts restores them to their original dimensions, and often results



Rod and piston alignment always should be included in a ring job. Slight rod misalignment may not immediately affect ring function, but may lead to noise and eventual failure.

in a piston which is structurally stronger than it was in the beginning. These piston re-conditioning processes are efficient and inexpensive. They should always be part of a good ring job when the piston condition calls for re-sizing.

INSPECT CYLINDER WALLS

Each cylinder wall should be carefully inspected for out-of-round, taper, scoring and cracks. If replacement rings are installed in cylinders that are scored or scuffed, they will not seat properly and blow-by is almost certain to occur.

The first inspection to the cylinder walls should be visual. Look at the condition of each wall. If a high-polish condition exists, this may be due to a "normal" varnish condition. Varnish can usually be removed by a thorough wiping with a cloth saturated with carbon tetrachloride. If the high-polish is removed by honing, the cylinders must be thoroughly washed down with soapy water. The soap and water wash is not necessary if the high-polish was removed with carbon tetrachloride.

Using inside micrometers, or a dial indicator, check the cylinders for out-of-round and taper. Taper, the difference in diameter between the top of the cylinder (ring area) and the bottom of the cylinder, is a vital consideration when fitting new piston rings. The tolerances for allowable taper have been increased in the past few years because of the increasing efficiency of piston rings. There are limits, however, past which even the best piston rings cannot be expected to control oil in a tapered cylinder.

The accepted limits on allowable taper are .012" to .014". If the cylinder has less than this amount of taper, replacement rings can be expected to give

(Continued on Page 73)

By GUY F. WETZEL
Technical Editor

Making good connections

Four main types of fittings are used for connecting gasoline, oil, vacuum and pressure lines. Fittings are usually made of non-ferrous metal and with proper selection for a specific job and correctly installed they will give satisfactory results.

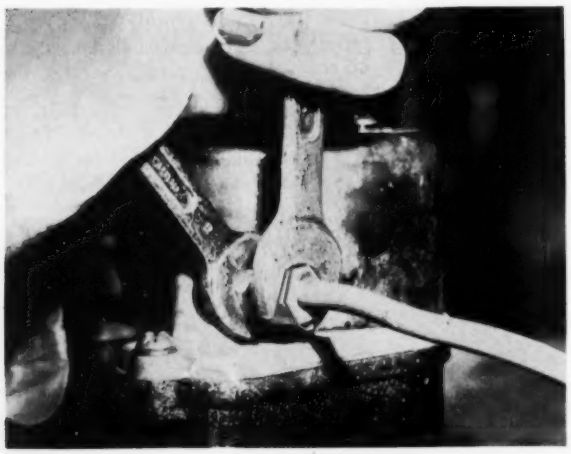
• MAKING CONNECTIONS—leak proof and trouble free connections—on gasoline, oil, and vacuum lines, is mighty important on the automobile. A good many mechanics and service men, with all the other things they have to learn, haven't gotten around to digging up the information about tubing fittings, so here is a summary covering this subject, which should bring out some helpful pointers.

Important to remember is that there are four main types of fittings. These are for connecting gasoline lines to the fuel tank, fuel pump, carburetor, etc.; oil lines inside the crankcase, and outside to the filter, oil pressure gauge, etc.; and vacuum lines for the distributor spark advance, vacuum-operated windshield wiper, vacuum pump (if used), and vacuum brakes (if used). CAUTION: None of the parts of any one type of fittings are interchangeable with any parts from one of the other types. This is where most of the mistakes are made in hooking up tubing fittings—trying to mate one part of a fitting of one type with a part from another type. It just can't be done to get a tight joint.

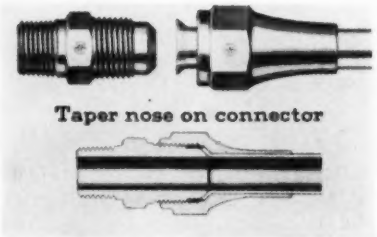
Tubing fittings fall into two types—flared and compression. In the flared type, two designs are used, known as S.A.E. flare fittings, and inverted flare fittings. Both use the same principle to make the joint tight. This is by clamping the flare on the tube-end between a male projection on one part and a female recess on the other part. The flare at the same time prevents the tube from pulling out of the fitting. The flare-type fittings are the most widely used, and as far as effectiveness is concerned the S.A.E. and inverted designs are on a par. The inverted type requires somewhat less metal and therefore costs a little less to make.

To make a satisfactory flare on the tubing end, a flaring tool must be used. Two styles of flaring tools are used which apply a single flare and double flare, respectively. The double flare requires the metal of the tube to be formed back on itself so that the flare is actually made up of two thicknesses of metal. Where steel tubing is used, it is necessary to use the double flare in order to keep the steel flare from

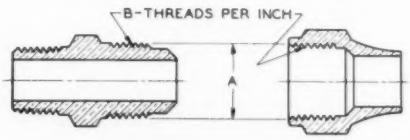
Two open end wrenches should be used when connecting and separating tubing fittings to avoid twisting the tube.



Commonly used tubing fittings are the S.A.E. flared type, a specimen shown herewith.



S. A. E. 45° FLARED



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A	5/16	3/8	7/16	1/2	5/8	11/16	3/4	7/8	1-1/16
B	24	24	20	20	18	16	16	14	14

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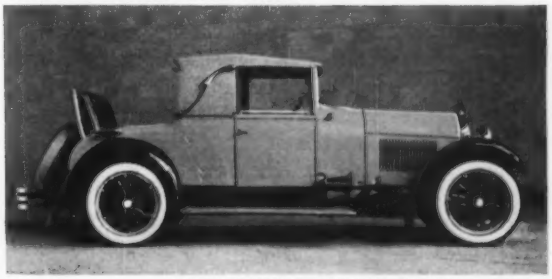

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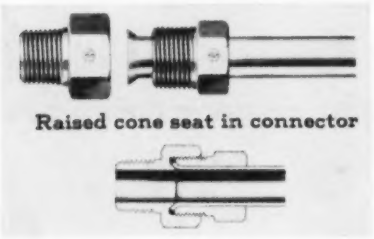
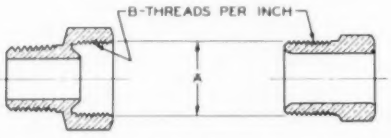
splitting, as the metal is stretched to form the single flare. Therefore, the double flare was adopted for use with steel tubing. To make this, the tube end is first upset with a suitable punch and then the end of the cup formed on the end of the tube is folded back on itself with a 90° punch, forming the double flare. Copper tubing can be used with a single flare but



Inverted flared tube fitting, same principle as S.A.E. fittings, but in reverse.

INVERTED FLARED



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A	5/16	3/8	7/16	1/2	5/8	11/16	3/4	7/8	1-1/16
B	28	24	24	20	18	18	18	18	16

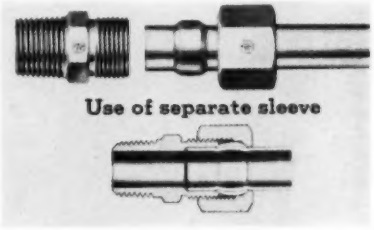
little more time is required to make a double flare, which is much better. It is worth while to use it on copper as well as on steel.

When using flare fittings it is necessary to slip the correct fitting part over the tube before forming the flare. If this is not done the fitting cannot be applied. A good many flares, accompanied by appropriate words, have had to be cut off and reformed because this was overlooked.

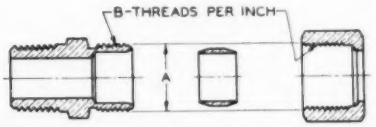
Compression type fittings are not used as much as the flared type for original equipment when the cars are put through the factory. However, there are enough of them used as original equipment and for repairs in the after market, making it worth while to know them. Two types of these are used on cars and trucks. They are (1) the three-piece compression type, and (2) the two-piece type. The former is usually called the "compression type," while the other is called the "double compression type." They are also referred to as the Type D and the G.M., having been used quite extensively on General Motors vehicles.

On the three-piece type, the female threaded nut is slipped over the end of the tube. Then the small ring (tapered each way from its center) is put on the tube about 3/16" from its end. The tube is then inserted in the female part of the fitting, the nut put on and tightened. This action forces the very thin edges at the end of the double cone, into the metal of the tube, which both seals the ring to the tube and locks the tube in the fitting. The pressure of the two parts of the fitting (in addition to the double cone) against the ends of the cone, forms the seal against leakage. A big advantage of both flare and compression type fittings is that they can be opened up repeatedly.

Compression fittings use a separate sleeve, instead of flaring the end of the tube.



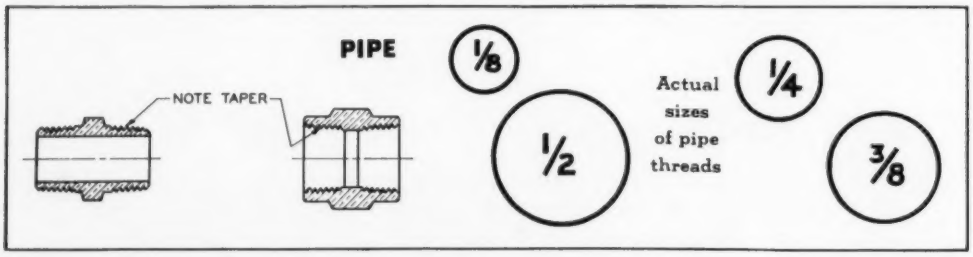
COMPRESSION



	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4
A	5/16	3/8	7/16	1/2	9/16	5/8	11/16	13/16	1
B	24	24	24	24	24	24	20	18	18

The double-compression, Type D, or G.M. type fitting has one end of the male threaded sleeve finished off to a thin edge. As the fitting is tightened with the tube in place, the recessed female part spins the thin edge into the metal surface of the tubing material to seal and lock the tube in place. As long as this type of fitting is not "opened" or disconnected, it does a good job. It is easy to apply. However, if it is located at a point where the part has to be removed and replaced several times, the male sleeve turns on the tube as the part is disconnected,

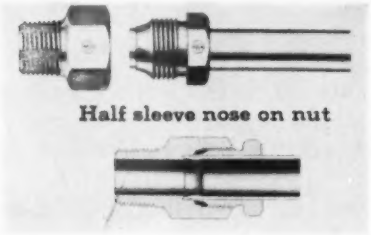
PIPE



Pipe fittings have tapered threads, both inside and outside.

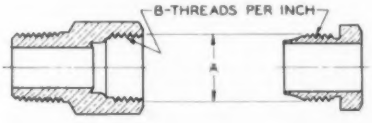
and the seal is worn. After being loosened and tightened more than once this fitting is quite likely to leak, even though it is securely tightened. This requires a replacement fitting.

Neither of the compression type fittings requires a flared tube-end, and for this reason they are somewhat more convenient to use. Of the two, the compression type is considered preferable to the double compression type.



Double-compression type tube fittings are used less than the other three types.

DOUBLE COMPRESSION



	1/8	3/16	1/4	5/16	3/8	7/16	1/2
A	5/16	3/8	7/16	1/2	9/16	5/8	11/16
B	24	24	24	20	20	18	16

THREADS USED

The threads used on tubing fittings are standard S.E.A. fine threads. In some cases the threads on fittings of different type are interchangeable, though the fittings themselves are not interchangeable. Thus it is possible to get two fittings of different kinds to go together and though they may seem to belong together, they will leak, and nothing can be done about making the joint tight, except to put the correct parts together.

For example, on each of the four types of fittings, 3/8-24 threads are used. On the inverted flare, compression, and double compression types, 7/16-24 threads are used, and on the inverted flare, the double compression, and the S.A.E. flare types, 1/2-20 threads are used on various sizes of fittings.

For making the connections to the engine components such as the carburetor, fuel pump, etc., pipe threads are generally used. These have a taper of 3/4" per foot of length. It is this taper which makes joints between male and female pipe threads tight through the wedging action as the parts are tightened. Pipe thread sizes are given in fractions of an inch, such as 1/8", 1/4", 3/8", and 1/2". Most of the connections on passenger cars are either 1/8" or 1/4", but all the pipe sizes are nominal sizes and are considerably different, of course, from the actual sizes. For example, 1/8" pipe size is actually about 13/32", and 1/4" pipe size is a little over half an inch.

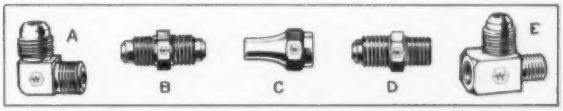
FITTING SIZES

The sizes of fittings are specified by the size of tubing they are made to fit. The automotive sizes of tubing are 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8" and 3/4". The double compression type is limited to 1/2" size. None of the different sizes is interchangeable with any other sizes of any type, so that it is impossible to make mistakes in this way. Tubing is specified by its actual outside diameter.

Outside of the few instances where tubing is joined to another piece of tubing, the purpose of tubing fittings is to make connections to power plant components. Therefore, in nearly every case one end of the tubing fitting will have a pipe thread on it. A pipe thread fitting cannot be screwed into any hole other than one tapped for pipe threads.

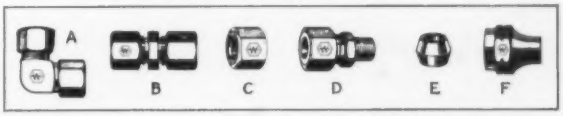
HANDLING TUBING FITTINGS

Tubing fittings usually are made of brass, generally hard and strong enough to do what it is supposed to do. However, it will not stand much abuse or rough handling and a few precautions should be observed when working with fittings. During removal or installation of a line, the mechanic must separate the two parts of the fitting. In all cases

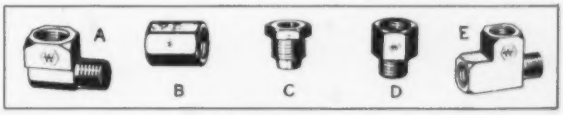


Typical S.A.E. flared fittings. A, male elbow; B, union; C, nut; D, male connector; E, adapter tee for oil filter.

Inverted flared types. A, male elbow; B, union; C, nut; D, male connector; E, filter tee.



Typical compression fittings. A, elbow; B, union; C, nut; D, male connector; E, sleeve; F, long nut.



Double compression type fittings. A, male elbow; B, union; C, nut; D, male connector; E, adapter tee for oil filter.

(Continued on page 78)

Essential distributor service

Ignition contact breaker points are the hardest working parts in the electrical system of a motor vehicle. Their performance depends much upon the procedure used during installation and tests.

• THE IMPORTANCE OF HAVING the ignition distributor correctly adjusted and in good mechanical and electrical condition is well recognized. In fact, if the ignition system is to function efficiently, the distributor should receive careful and competent attention every 5,000 to 10,000 miles.

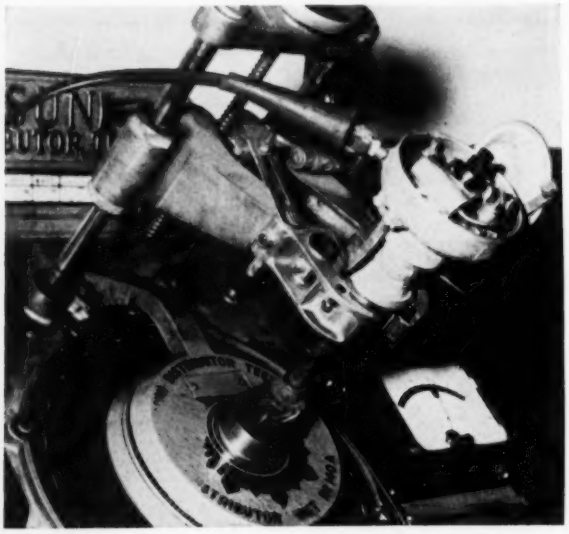
This essential unit performs several vital functions such as (1) interrupt the primary ignition current at a very rapid rate, (2) distribute the high tension current to the respective spark plugs after the voltage is stepped up by the ignition coil, (3) advance the ignition spark timing in proportion to engine speed, (4) control the ignition spark timing in proportion to engine load, and (5) receive and ground the self-induced primary current caused by the collapse of the coil magnetic field. All of these functions must be performed efficiently and in exact synchronism with engine speed and load conditions.

The distributor is a precision device, which has to work at incredible speeds under certain conditions. For example, a V-8 engine running at 3600 RPM, will open and close the contact breaker points 14,400 times per minute or 240 times per second. And every time the points close they must make a good electrical contact to permit a surge of primary current to pass. If they don't do this there will be no spark and the spark plug will misfire.

The distributor contact points (or breaker points) are the hardest working parts in the distributor and require the most frequent attention. However, if they are properly installed and treated with reasonable care, they will last for 20,000 miles or more. Actually on a car that is fairly well taken care of, the points will seldom be allowed to go that long.

There are two approaches to distributor service which are followed by motorists in general. One is a preventive maintenance program, where parts are replaced before they approach the end of their useful life to avoid failure or breakdown in service. The other is to operate parts until they do fail and then have them replaced or repaired. It is obvious that the preventive maintenance idea is by far the better. Even though at times it may cost more, it is more economical in terms of convenience, safety, and satisfaction. This should be kept in mind when offer-

By GUY F. WETZEL
Technical Editor



Distributor mounted in testing machine. Many excellent testers are on the market and only by removal of the distributor and subsequent running in the tester does the mechanic and tune-up man get the full facts on performance.

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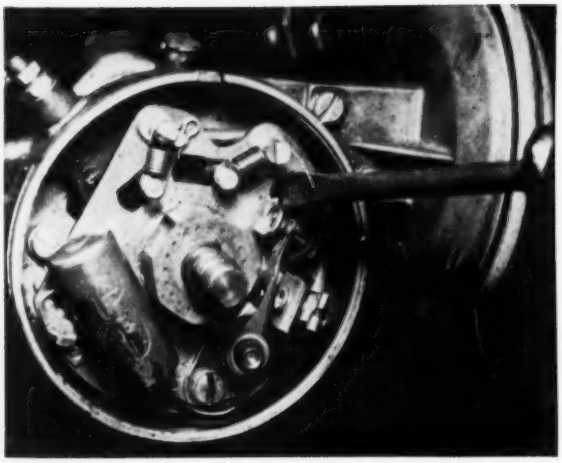


Vacumatic distributor (1955-56 Mercury and Ford V-8). Similar type is used on current model sixes. Note adjustment springs. Turning each of the partly cut-away screws will tighten or loosen the spring tension and modify the advance curve.

ing preventive services to your customers. Hardly any customer **wants** to spend money on his car, but, sensible car operators realize that they must have at least a minimum of service performed for reasonably satisfactory service from their vehicles.

In servicing the distributor, the contact points are generally replaced. When they are correctly installed, the points will be accurately aligned. The stationary point is made with a slightly rounded or convex surface. The radius of curvature is three inches which causes the center of the contact surface to be about .002 in. above the rim of the surface. If the surfaces are correctly aligned, the center of the rounded stationary point will contact the movable one exactly in the center. No contact points should be put into service without this being checked and corrected if necessary.

After the points have been in use for 500 to 1000 miles or more, the normal wear and electrical erosion will cause the raised part of the stationary point to be worn flat and the two contact surfaces will become mating surfaces with the maximum electrical conduction from point to point. The surfaces will normally be a clean, silvery gray color. As time goes on there will frequently be a transfer of metal from one point to the other, but there will still be mating surfaces. If transfer of metal becomes quite marked it is time for the contact points to be replaced.

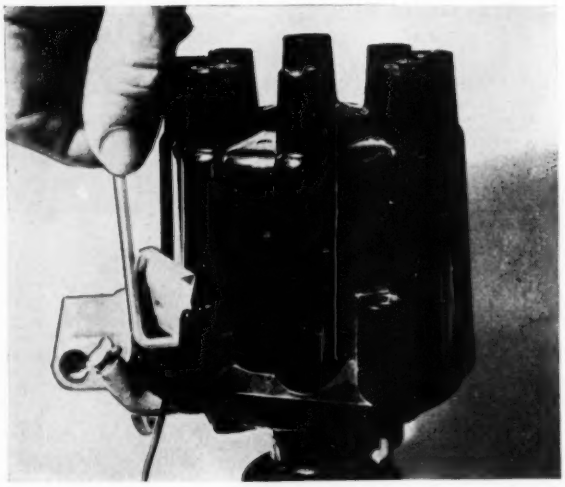
Most of the replacement point sets are now assembled on a base plate and presumably are correctly alined. However, they should be checked for alinement, preferably with a 10-power magnifier. While it is physically possible to install new points in a distributor with the latter in place on the engine, it is generally agreed by expert tune-up men and mechanics that a much more precise job can be done if the distributor is taken off the engine and serviced on a distributor tester.

Not only is it more convenient to work on a distributor when it is on a testing machine, but other operations can be readily performed at the same time. The installation of the new contact points is not complete until the dwell or cam angle is correctly set. This is done as soon as the points are placed and connected. With the distributor driven by the tester, the next thing to check is the dwell variation. This normally should not be over 3°-4°, though on some of the Auto-Lite distributors the breaker plate is not centered around the distributor shaft but is somewhat off-center. This results in a greater dwell variation with movement of the breaker plate as the spark is advanced, and which may get up to 6°-8°. Except on these distributors, the dwell variation is caused by slight irregularity of the breaker cam, or wear in the distributor shaft bushings, or both. Occasionally a bent shaft will cause dwell variation.

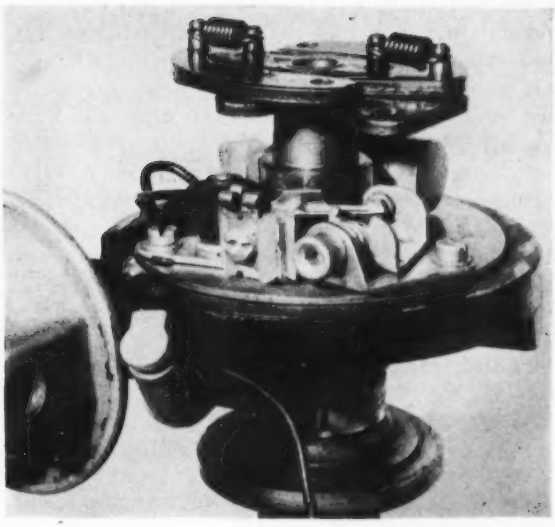
An important point which should not be overlooked in connection with contact point dwell is that for every degree of change in dwell angle there will be a degree of change in ignition timing. As the rubbing block on the breaker arm wears, the breaker cam will have to turn more before it hits the rubbing block and opens the points. This means that the spark timing would be retarded correspondingly. When spark timing is off because of error in the dwell, the dwell should be corrected before adjusting the timing. Another test that should be made before leaving the breaker points is to check the breaker arm spring tension. This in general should be 19-23 oz. on Delco Remy distributors, 17-21½ on Auto-Lite, and 17-20 on Ford-built cars.

To check the action of the distributor cam and breaker arm, the firing pattern is observed on the

Adjusting the cam dwell or point gap with an Allen hex wrench, from outside the distributor cap. Note that cap covers entire distributor.



Distributor cap and rotor removed, showing governor weights. Directly in front is the Allen head screw which adjusts the dwell and breaker point gap.



Delco-Remy distributor with rotor in place above the automatic advance mechanism. The rotor is removed by taking out two round head machine screws.

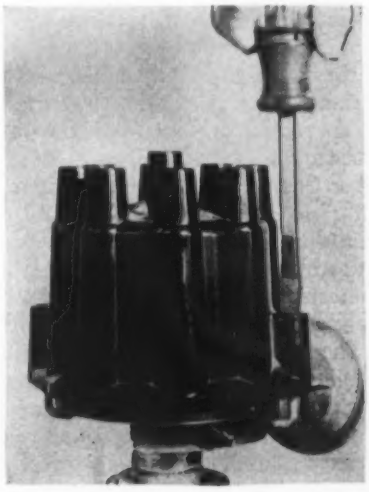
distributor tester or distributorscope. This will show the angular deviation, if any, between the sparks actuated by each cam lobe. Two other valuable checks are the observance of automatic advance and the vacuum advance. Compare the actual amount of automatic (or centrifugal) advance at different speeds with the specifications of the distributor for the car model under test. Any appreciable variation should be corrected by bending the centrifugal advance springs or replacing them.

To check the vacuum advance, the vacuum at the tester is increased in the specified steps and the resulting advance observed. If the actual advance does not coincide with the specified advance, the vacuum advance diaphragm device will have to be replaced and/or the vacuum advance linkage and breaker plate made to work freely. Then the system will be sensitive to changes in the manifold or carburetor vacuum.

Men doing tune up work report that they frequently find ruptured or otherwise defective vacuum advance units. Correct operation of the vacuum advance device is essential to give satisfactory engine operation. If it is not working as it should the motorist will have a legitimate complaint. Cases have been frequent where a tune up job supposedly was done but when checked later on a distributor tester it was found that the vacuum advance was inoperative. Owners had been complaining about poor engine performance.

Another essential part of the distributor, but one that seldom gives any trouble, is the condenser. This small, non-moving unit, is generally replaced when new contact points are installed. Actually this is seldom necessary, as the new condenser is generally not any better than the old one, and in some cases maybe not as good. However, by putting in a new one each time new points are installed the mechanic is protecting himself. If he did not do so, and if the old condenser failed, the car owner could blame him for being careless and not doing a thorough job. On the other hand, if the new one should fail the mechanic can say that he did his part by putting in a new condenser, but cannot predict its performance.

The purpose of the condenser is to receive the low tension current that would otherwise cause a spark at the contact breaker points as they open. This absorption of the electrical energy at this instant causes the necessary rapid collapse of the coil magnetic field. The condenser also helps to dissipate and discharge the self-induced voltage generated in

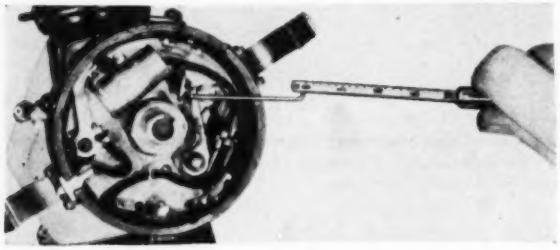


Removing the distributor cap. To loosen the clamps, press downward with a screwdriver and slightly turn clamp.

the primary winding of the coil as the coil magnetic field collapses. As stated, the condenser seldom gives trouble but when it does fail the engine will not start or run. As there is seldom any external appearance of a defective condenser the only safe procedure when the condenser is in doubt is to test it or replace it if testing means is not at hand.

Thus far we have considered distributor trouble spots at the breaker points or contacts, their adjustment and spring tension, the breaker cam and distributor shaft bearings, the centrifugal or automatic spark advance, the vacuum spark advance, and the condenser.

A distributor job would not be complete without



Always check the breaker arm spring tension with a tension scale. Tension varies from 17 to 23 ounces of pull, as mentioned in the text.

carefully inspecting the distributor cap, and especially the inside of each of the high tension cable towers. If there is a poor contact at any of these towers due to corrosion which may come from dampness or a jumping spark inside the tower, the high tension current that should go to each spark plug in turn will be weakened and may cause misfiring at the plugs. In this case, either the inside of the towers should be cleaned out carefully, or a new cap should be supplied.

Within the last few years Delco Remy has introduced an external adjustment type distributor, with a small window in the cap providing easy access for adjustment of the dwell angle or contact point spacing while the cap is in the mounted position. The cap is held to the distributor by spring loaded latches, opened by pressing downward and turning, with a screw driver. On this distributor the movable breaker plate is located below the rotor and the centrifugal spark advance mechanism. It uses the outer diameter of the main shaft bushing for its outer pivotal bearing surface. The movable plate is held in position by a retainer spring assembled in a groove in the upper shaft bushing. The contact point assembly is attached to the movable breaker plate and is serviced as one complete assembly.

The hinge cap oiler should be filled with S.A.E. 20 oil at each vehicle lubrication period. When putting in new contact points a trace of approved cam-and-ball-bearing lubricant should be applied to the breaker cam. Distributors equipped with a cam lubricator should have the wick replaced at the time the contact points are replaced. Do not attempt to oil the wick. Replace it when necessary. When putting in a new wick, adjust its position so the end of the wick just touches the lobe of the breaker cam. The high tension rotor is removed by taking out two round head machine screws.

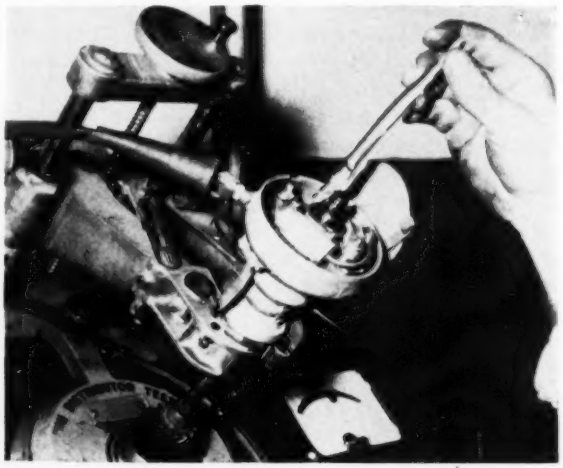
On the 1955 and '56 Mercury and Ford V-8 engines the full vacuum controlled distributor was used, with no mechanical or centrifugal advance. The whole control of spark advance, both to compensate for speed and load is done by means of vacuum picked up through specially calibrated orifices in the carburetor. The same plan of spark advance control is used on the Ford six cylinder engine up to the current models. To calibrate and check all these distributors it is necessary to use a sensitive vacuum gauge or manometer that will read down to 1/10 in. of mercury, as the vacuum used is considerably less than the manifold vacuum. Reference must be made to distributor specifications when checking and adjusting these units.

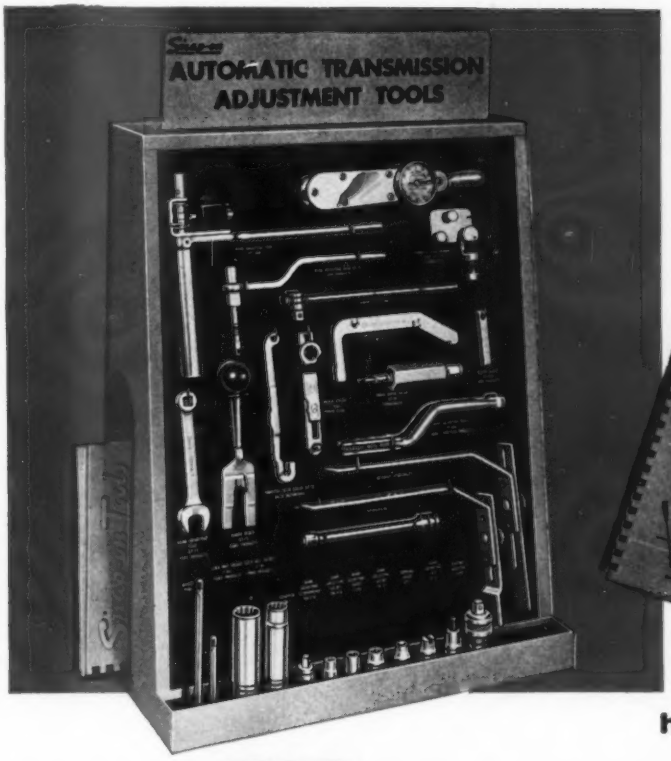
When a distributor is being worked on in connection with a tune-up job or to correct trouble in the ignition system, the old contact breaker points should be carefully inspected to see what condition they are in. This inspection will tell whether the condenser is approximately the right capacity, whether there has been trouble from over-heating of the points, and whether over-lubrication or the wrong kind of lubricant has contributed to breaker point failure.

The presence of excessive amounts of lubricant or the wrong kind of lubricant will cause the points to oxidize so that they become poor conductors of electricity. This will lead to hard starting and may keep the engine from running at all. It can be identi-

(Continued on page 80)

Applying lubricant to the breaker cam. This lubricant should of an approved type for cam and bearing, applied sparingly.





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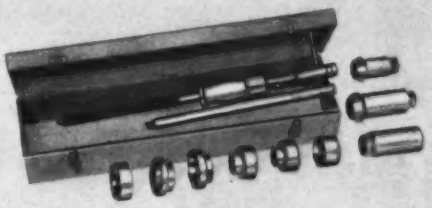

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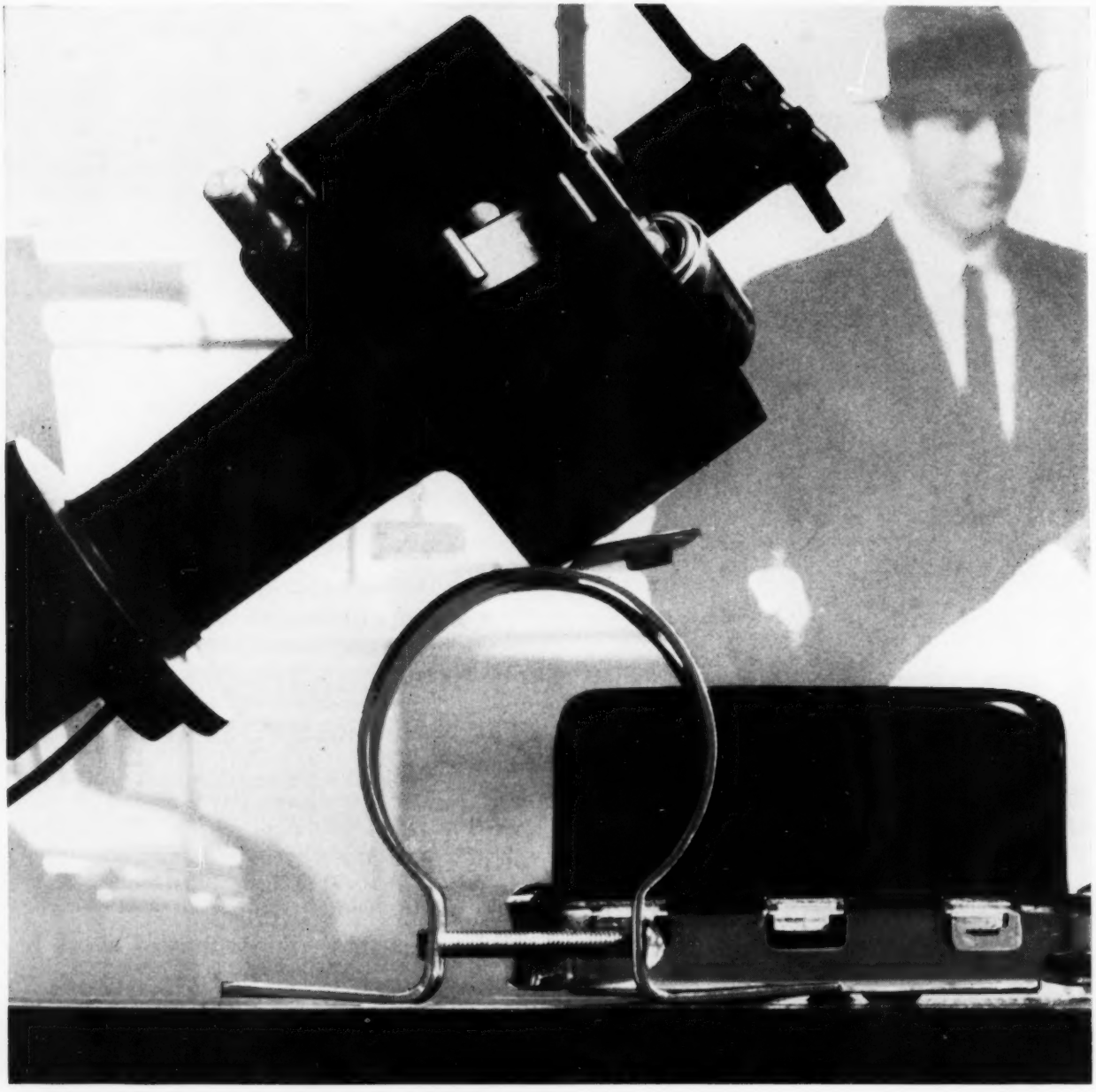

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● THE BODIES OF American-built cars are of steel, so constructed that practically any part can be replaced by a competent body sheet metal man. But tackling a badly deformed right front corner of a fully welded aluminum body on an expensive import car, with no body replacement parts available is a challenge. In many cases it is both difficult and expensive.

This was true in the case of the Bristol Ace, shown in the illustrations. The car was struck on the right front corner, practically demolishing the front of the fender and the lamp housing, and badly deforming the grille opening.

The body on this car is made of aluminum, throughout, with all the formed sections welded together. It is an open body car with no rigid top or "green house." The body lines are flowing and smooth, with no angles or joints, where parts could be readily cut out and replaced.

Being practically a hand made body there were no repair panels or sections available in this country, though it is possible some parts might have been obtained in England.

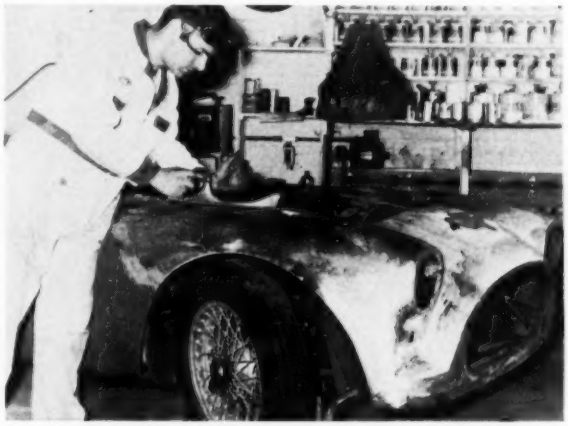
There was no alternative, therefore, but to go ahead and do the job with the materials at hand, consisting of some flat aluminum sheets, welding rod and suitable solder.

The work was done in the Park Ridge, Illinois shop of Peter J. Malone, where only import cars are serviced and repaired. The first step in the repair of this body was to get the damaged parts into alignment, as completely as possible. In doing this work it was found that the same corner of the body had been previously damaged, which naturally complicated the job. Some of the original metal had been pounded out, filed and ground, so that it was both brittle and thin.

This required considerable building up by sheet aluminum, hammered into shape and welded into place. As any body man will testify, welding aluminum requires skill and know-how. If the metal gets a little too hot it becomes liquid and flows away from the spot. If it is not hot enough it doesn't go into place and adhere.

As the lamp housing was damaged beyond repair, it had to be rebuilt. The curved surfaces were formed out of sheet aluminum, welded into place. The flange to which the head lamp is attached, was built up by welding. The template made from the undamaged left lamp housing served as a guide to get the correct size and form.

By a combination of metal forming and welding, the grille recess was brought back to the correct form and size. After the various parts were built-up by welding, the surfaces were tinned. The tinning was done with a special solder which will stick to aluminum and also to which ordinary body solder will adhere. This makes it possible, on an aluminum body, to use the usual leading procedure, after the tinning is done with the special tinning solder.

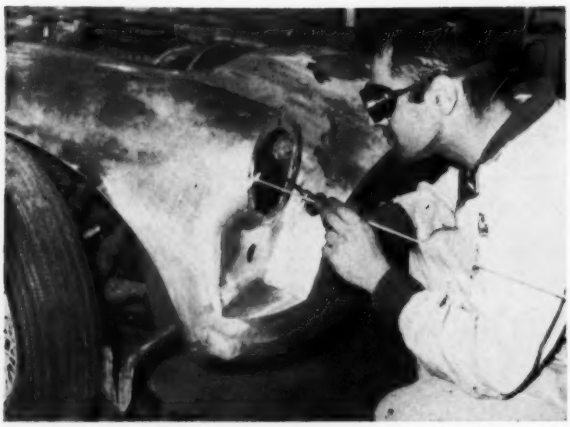


Using the body file to smooth off the body lead applied after the surface was tinned with a special tinning solder that will stick to aluminum and to which body lead will adhere.

In order to get the body surfaces smooth and with the correct contours, fairly large areas were leaded and then smoothed out, using a body file and disc grinder.

The body repair was costly—and not too profitable, due to the time consuming work involved in practically rebuilding the entire front end of the body, and the fabrication by hand of some of the replacement sections.

Building up the flange of the headlamp housing by applying welding rod of aluminum.



The metal work finished around the lamp housing and the grille opening.

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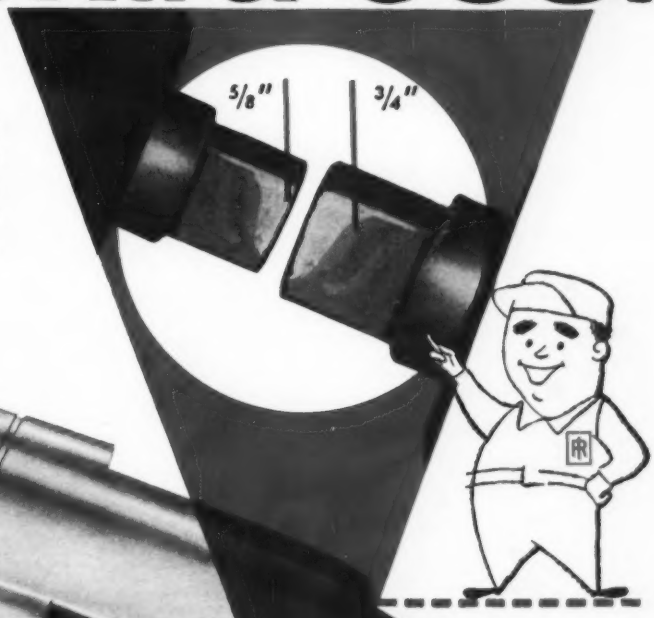

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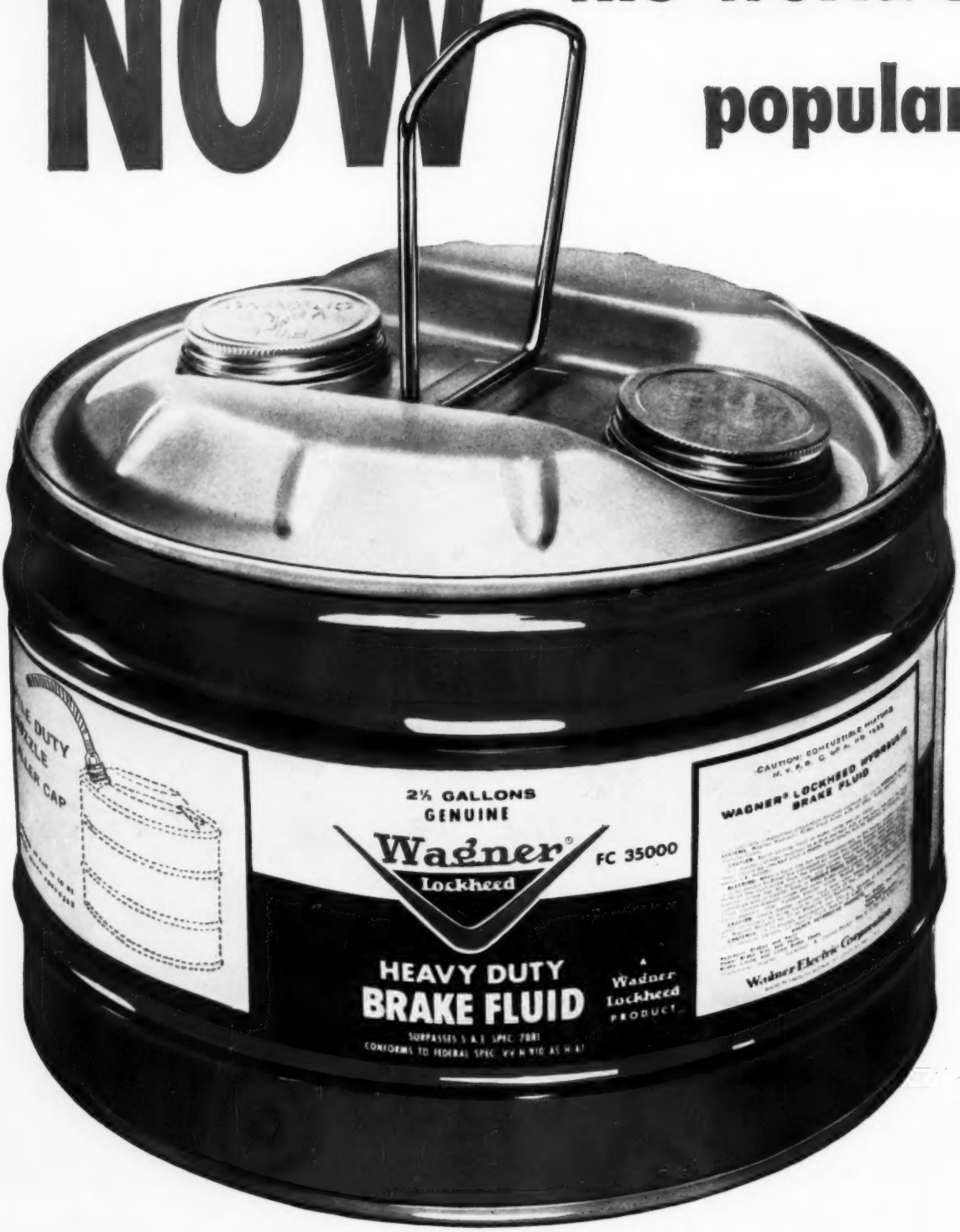

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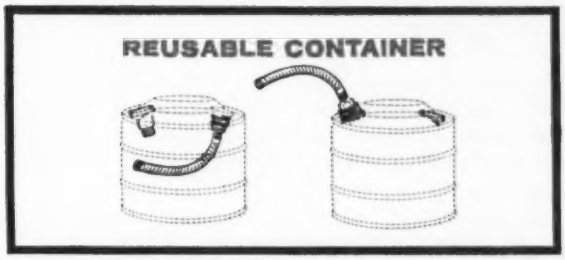
You'll empty them in jig-time, too, for Wagner Lockheed is the world's largest selling, fastest selling quality brake fluid. And rightfully so, for it is chemically balanced to operate under high temperatures or in sub-zero weather. It provides proper lubrication for all parts of the brake system; absorbs moisture to prevent rust or corrosion; doesn't cause rubber parts to swell. You'll protect brake systems,



and the lives of your customers, when you refill with Wagner Lockheed.

By the way ... the cans are a $2.50 value. You get them for a fraction of that. So, next time you order brake fluid, specify Wagner Lockheed Heavy-Duty or Super Heavy-Duty 21B Brake Fluid in the 2½ gallon container.

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AIR BRAKES • TACHOGRAPHS • ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES

More productive shop space

Now that we are on the brink of the "Golden Decade," automotive repair shop owners will find it advantageous to re-evaluate the efficiency of their service facilities and make sure they are in a position to cash in on the increased volume of vehicles that will be in need of service.

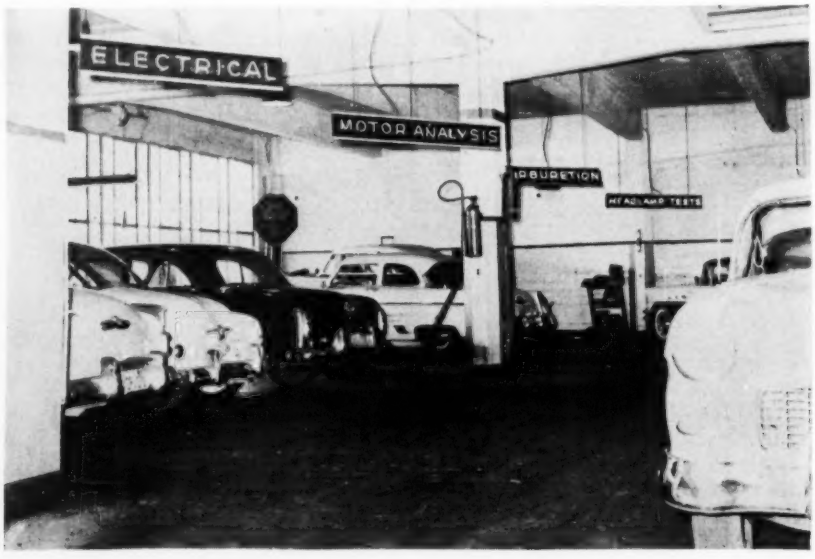
• IT'S UNFORTUNATE, BUT TRUE, that a good share of the automotive service establishments "just grew." The growing part is not unfortunate . . . that's good. But it is the manner by which many small shops grow into medium or large shops that can lead to eventual disaster. A typical growth pattern usually finds a stall or a bay tacked on here, a doorway knocked out there, or a permanent hoist or front end machine installed in an area where it shouldn't be but is because it "looked like a good place at the time."

All these are common earmarks of a shop that grew without planning, and a little planning is like a little leak in the roof; you know it's going to get worse unless something is done about it.

Owners of small or medium sized repair shops are sitting in a real comfortable chair. All the "brass" of the automotive business is looking forward to gigantic growth in the next ten years. One car company's president predicts 40 million **more** vehicles on the road in the next few years. Couple this to the growing shortage of skilled mechanics, the obvious conclusion is that the existing mechanics and service facilities are going to be servicing far more vehicles per day, week and month.

That is, they are going to experience a favorable growth in the volume of their service business **if they are equipped to handle the increased traffic flow.** Now is the time for the shop owner to take a long, hard look at his place of business to see if it is (1) the most efficient layout for the existing conditions, and (2) if it is designed to permit quick, orderly growth in the future.

Many shop owners shake their heads at the car owner who knowingly allows his car to operate with two or three fouled spark plugs, but the same shop owners may well be operating their service space at 50% below its possible efficiency. Along this line



In the rearrangement of existing service space, the possibility of removing partitions (especially temporary) or relocating storage areas, as necessary, should not be overlooked.

studies made by Ford Motor Co. indicate that planned re-arrangement of existing space—without new construction or major remodeling—can often mean smoother traffic flow, increased service efficiency, and 50% or greater increase of **productive** area, or work stalls.

Space is valuable. Misuse of space is a luxury few can afford. The overhead on idle space—or waste space—is just as high as it is on productive space. It takes just as much heat, lights, rent or taxes to accommodate waste space as it does in money-making space. Many service shops are turning away profitable work because of being all bottled up with poorly arranged work space.

YARDSTICKS FOR EFFICIENCY

Granted all service shops are not alike; there are still ways by which the efficiency of any and all shops can be accurately judged. All it takes is a little time, pencil and paper.

For paper, use "10 x 10 to the inch" graph paper. This is inexpensive and can be obtained from a stationery store. In cases where there are several separate buildings to consider, it's possible to use different sheets for each building, or scotch tape the sheets together at the edges to make a large enough single sheet for the entire layout.

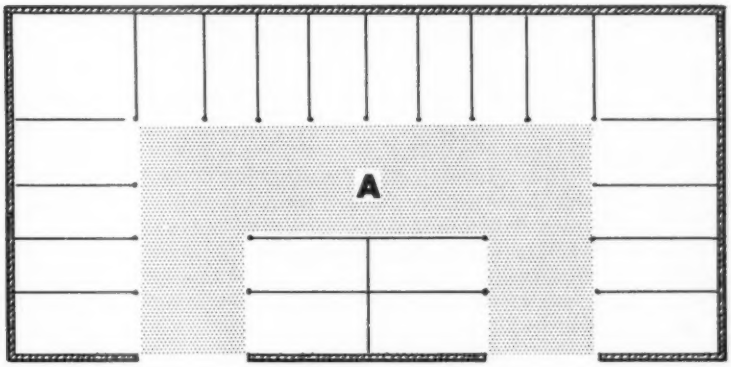
An ordinary lead pencil will do for sketching, and for those who find it difficult to draw a straight line, a one-foot ruler will make things a little easier to follow.

It's best to make all dimensions to scale. A scale of 1 inch equals 1 foot works well in most instances. As a preliminary step, sketch in everything within the service area, as it currently exists. Include all walls, doors, windows, columns, stairs, ramps, pits, hoists, and stall boundary lines. Show air compressors, front end machines, etc. Indicate the size and location of locker rooms, toilet rooms, utility rooms, parts racks and any other rooms in the service area.

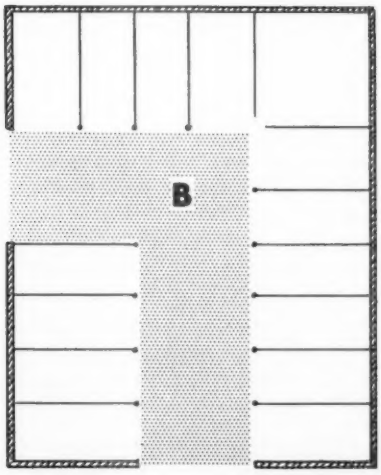
All load-bearing walls should be clearly indicated as "unmovable." This same indication should be noted where it applies. Some pits and hoists are virtually unmovable without considerable expense, and, therefore, should be considered permanent fixtures.

Once the entire shop is correctly sketched to scale, cut out scaled templates of car and truck stalls, and heavy equipment. Make as many individual templates as you require. It's better to have more to play with than to guess at their actual size. Place the templates on your scaled sketch, using as many different arrangements as possible. Look carefully for the one arrangement that will give you the best possible traffic flow and the maximum number of productive work stalls.

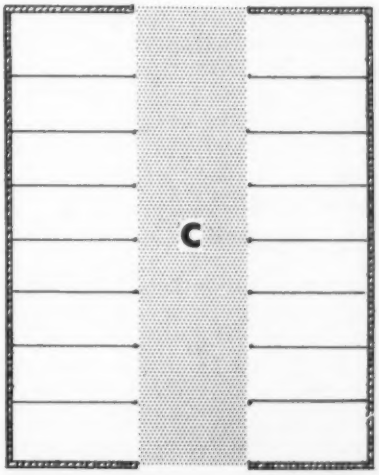
Bear in mind as you juggle the templates around



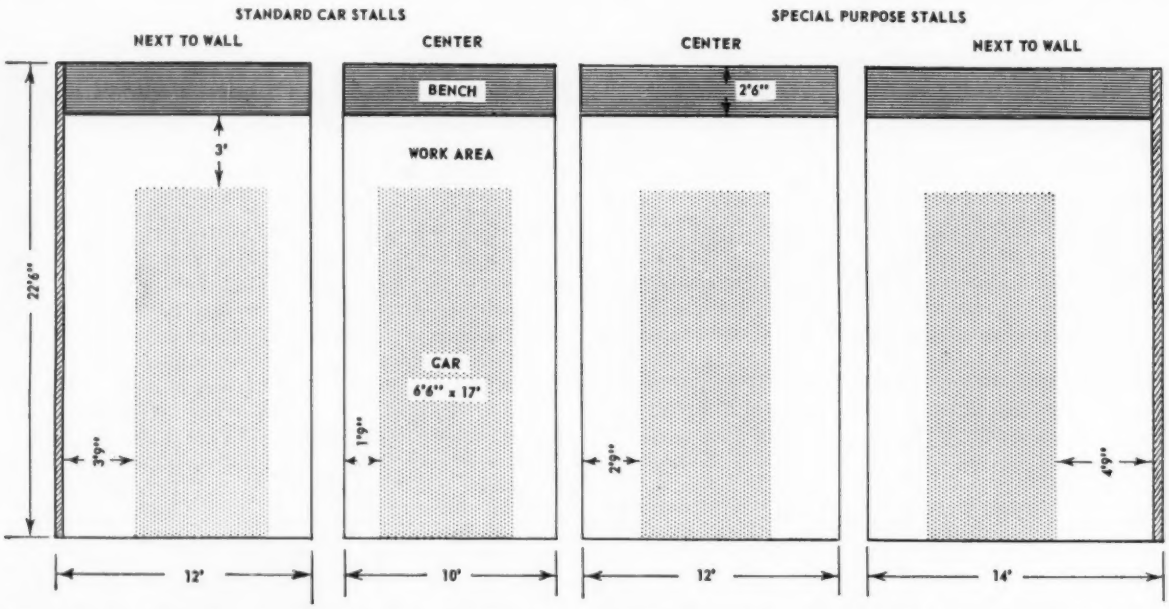
The diagrams A, B and C show, respectively, aisles providing "U"-shaped, "L"-shaped and "I"-shaped areas. Handling traffic through the building is important, but not to the extent that there is little or no place for the working areas.



Three basic shop plans, with shop traffic routed in one direction (where possible) to speed traffic and reduce congestion. Twenty foot aisles permit stalls to be placed at 90 deg. to aisles. This permits 5 cars to be parked in the space used by 4 at acute angles. Naturally, the entire space cannot be used for stalls, since space has to be allotted to shop equipment, parts, washroom, etc.



that the walls or partitions not labeled "unmovable" can be thought of as not being there at all. If you discover a very desirable arrangement of working stalls, but notice that it conflicts with existing storage spaces or partitions, make the change in favor of the increased working space. Throughout the entire operation, remember the importance of suitable aisle space. Very often the use or misuse of aisle space makes or breaks efficient service-area layout. If you are lucky enough to have a building which permits the use of 20 foot aisles, it's possible for you to park five cars in the space ordinarily required for parking four at an angle, dictated by narrow aisles. The 20 foot aisle allows stalls placed at 90° to the aisle. This, ordinarily, is the most efficient stall layout.



Dimensions for car stalls, as suggested by the Ford Motor Co. Special purpose stalls are used for wheel alignment, lubrication, undercoating, painting and so on. Since modern motor cars usually have wide doors, it is best to allow at least 4½ ft. between cars parked in stalls. It's well known, of course, that mechanics can do a better job if they have enough "elbow room."

It's also interesting to note that the "I" shaped building is the most efficient in that 70% of the total floor space can be arranged so that it is productive. In your long range planning, it might be well to keep in mind future expansion which allows you to use the "I" floor plan, if you are presently using some other arrangement.

WATCH TRAFFIC FLOW

In medium to large repair shops, traffic flow can be a problem. There will always be some drive-through traffic. As you know, some car owners drive in through the front door, find out what's wrong with their automobile and drive right out again. These "be backs" can tie up a shop rather badly. There's no way to determine if a person is an actual customer, or just a shopper. All customers and prospective customers must be treated with the same courtesy and interest. There is a way, however, by which the traffic can be kept flowing through the shop. The answer is simple . . . have separate entrance and exit doors. There's nothing worse than a good size shop with only one service entrance, and no special service exit. Backing cars out through the entrance is a nuisance. Not only is it a slow process, but very often other customers are waiting to get into the building. Some potential customers, seeing the kind of traffic jam they might be letting themselves in for, decide to stay out of it and go down the street to a more accessible shop. Even small shops should find it advantageous to have separate doors for entrance and exit.

Main service doors should be high enough to accommodate trucks. Most every small shop can increase its service volume if it caters to the truck trade. Quite often, the only thing that stands between a small repair shop and a juicy bit of truck business is a door through which the truck cannot enter. A shop equipped to handle truck work quickly usually finds it gets all the truck work it wants. Certainly, when planning any work to existing doors, or when planning on putting in new doors, make sure they are at least 14 ft. high. There's no need to specialize in this business unless you want to, but, usually, several good truck or fleet accounts represent a steady source of gross income for any shop.

Just as important as efficient use of space is efficient use of time. This is true of any business, but it can be especially true of the automotive repair busi-

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ness. Few other places of business operate under a more confusing and delaying set of rules. If you were repairing washing machines, for example, you would probably do most of your repair work in the customer's home. The customer furnishes all the overhead in the way of a place to work; all you need is a panel truck full of parts and a telephone answering service. The same thing is true of many other kinds of service businesses from home repairs through television servicing.

In the automotive repair business, however, the situation is reversed. In the first place, the customer brings his work to you. Very often he brings his car in for service, then goes about his business. In effect, the shop owner must furnish parking—maybe even storage—space during the time the customer leaves his car and when he picks it up after it has been serviced.

If all goes well, the customer returns to the shop after his working day is over. The repaired or serviced car is delivered, and every one is happy. There are times, however, when things do not go exactly according to plan. When this happens, the shop owner may find himself stuck with an extra automobile to "store" for a day or two. This could be the fault of the car owner for various reasons, or it could be the fault of the shop because it couldn't deliver the car in the time promised. Or, because the shop ran into a snag either in the job itself or in getting the parts with which to work.

"DEAD" CARS A SPACE KILLER

At any rate, the car is now the overnight responsibility of the shop owner. Where he puts it can have a direct bearing on his productive space. Usually he'll run it into a vacant stall where it roosts for the night. In the morning, the car will be moved outside to make room for the day's business. An isolated situation of this kind isn't too bad, and there are no special rules to follow in handling the situation. The big hitch comes when the situation is repeated with painful regularity. In some shops, it's not unusual to notice several "dead" cars sitting around. Some are awaiting service, some are tied up for parts, and others are waiting to be picked up by their owners.

The "boarding costs" on these cars run high. Not only do they take up valuable space that should be used to make money, but they can represent tied up capital. Either or both conditions are not good. They call for a little more planning on the part of the shop owner. To prevent the situation from getting out of control, he must schedule his operations to prevent the pile-up of surplus vehicles. If it is unavoidable, he must provide suitable storage space in which the dead cars can be put so that they will cause the least possible inconvenience in the process of earning money.

There are several ways to do this. Should the interior shop space be plentiful, a special section can

be assigned to "storage" vehicles. In such space, cars can be placed much closer together than they can be when taking up space in a normal-sized working stall. Also, the storage space itself can be located out of the way from the ordinary traffic flow. This will assure nominal interference with vehicles moving or to be moved.

A second solution is to rent low-cost storage space. One enterprising shop operator rents a four-car garage which is next to his shop. The storage garage was designed primarily for residential use, but the neighborhood underwent a change which made the garage just an empty building. It serves excellently for storage facilities, and requires none of the ordinary utilities such as heat, electricity, water, or telephone. The very low rental paid for the parking privileges is more than warranted because it gets the "dead wood" out of the productive shop space.

A third answer to the problem is the outside parking lot. This need not be next to the shop (although very desirable) but it can be located as far away as two or three city blocks. A vacant lot often can be rented or leased economically per month. Most shop owners who do rent storage lots find their insurance companies require a locked fence and adequate lighting before they will be responsible for theft of the car or any of its parts. When this is true, the cost of fencing and lighting is soon amortized because the shop is free of congestion-causing cars and begins to operate more profitably.

A fenced and lighted storage yard can also serve as additional advertising space. A well lettered sign identifies the lot as part of the service operation. This, in turn, indicates an aggressive shop which handles an unusually large number of vehicles. Such advertising is effective, and creates considerable respect for the shop or garage.

OUTSIDE STORAGE

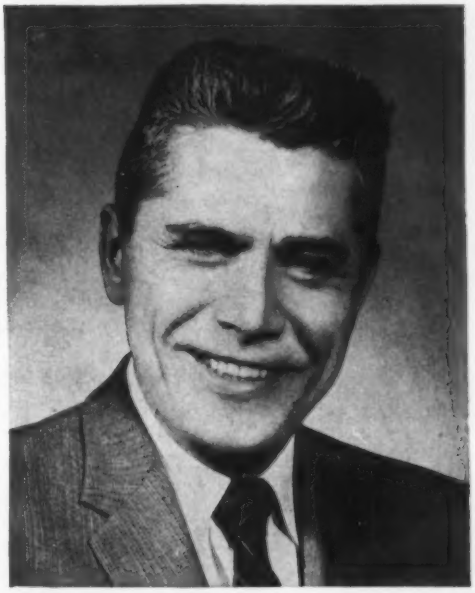
If your actual working space is limited, and if you find you are being restricted from making as much money as you should because cars which aren't being worked on are cluttering up the place, see if there isn't some way you can get the cars out of the shop into less expensive storage areas.

Finally, with a little study and concentrated effort, the down time due to lack of replacement parts can be considerably shortened. An adequate inventory can help here. Clear out all the slow moving and obsolete parts. Keep a fast moving inventory, but be sure to stock the items you really need. In a normal inventory check of an average repair shop or garage, it's common to find a number of space-eating odds and ends like mud flaps for an Essex, a badly cracked transmission case, a number of burned out sealed beam headlamps, running boards for a '28 Chevy. Obviously, it's expensive providing storage space for things of this sort. Throw them out and replace them with inventory items which have turn over and make money. Often they can be sold for junk. The money they bring can be put to work earning more money. The space they take up represents nothing more than a drain on the operating budget.

With thoughtful planning, modest but intelligent re-arrangement of existing facilities, low-cost storage space and an overhaul of the inventory, most every service shop can up-date its physical plant and its operating technique to stimulate and activate an increased volume of service business.

The time to do this is **now**. It is the well-planned, efficient, and clean-appearing service shop that stands ready to enjoy the extra money to be made from the inevitable step-up in the number of motor vehicles which will require competent service in a shop.

Murray K. Simkins, Executive Editor Automotive Service Digest



Murray K. Simkins has been named Executive Editor of Automotive Service Digest. Mr. Simkins, long known in automotive circles, comes to the staff with fifteen years of experience in the truck and passenger car fields. He has served in various editorial capacities with the Chilton Company, and until recently was Training Program Coordinator of the Jam Handy Organization. He is a member of the Society of Automotive Engineers and is presently serving on several technical committees. Among his other duties Simkins will direct the editorial operations of the other publications of National Market Reports, Inc., the parent company.

Teaming-up Corvair Carburetors

Twin carburetors, when separated by a matter of three feet or so, can pose a problem should the uninformed mechanic be faced with the job of synchronizing and adjusting them. A step-by-step work plan must be followed for efficient overall operation.

● IT'S BEEN QUITE awhile since an American automobile manufacturer has built a production vehicle using twin-carburetors exclusively. Twin "pots" are nothing new, but their appearance on Chevrolet's Corvair makes it imperative that service mechanics get filled in quickly on the why's and wherefore's of required service techniques.

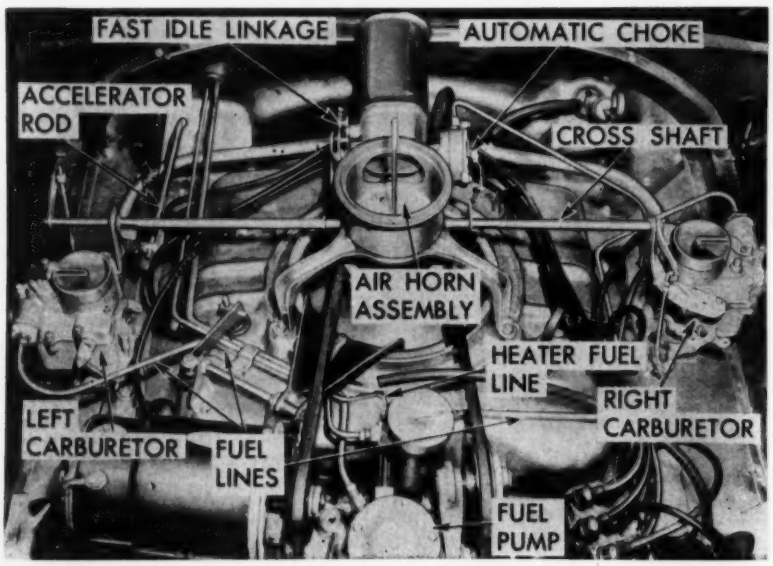
When two mechanical components are designed to operate independently of each other, yet in over-all unison, a synchronizing problem rears its ugly head. So it is with the Corvair carburetors. These carburetors are not complex, and servicing and adjusting them is not a complicated procedure. A step-by-step work plan is a must, however, if the carburetors are expected to deliver top-notch performance.

The Corvair engine is equipped with two identical Model "H" Rochester single barrel, downdraft carburetors; one mounted on each intake manifold with an insulator block or gasket (early production) between the throttle body and intake manifold flanges. These carburetors use a conventional float and idle system, but have a main nozzle assembly which terminates in a radial cluster of four horizontal tubes instead of the ring-shaped booster venturi cluster used on other Rochester carburetors. The radial nozzle cluster is designed to operate more effectively with the relatively slow gas velocities present with small displacement engines using two carburetors.

The Model "H" bowl cover includes a built-in fuel filter element, but has no choke valve; this function being handled by a central unit common to both carburetors. The throttle body and bowl is a one-piece casting incorporating the accelerating system. No provision is made for a power enrichment device such as a power piston or metering rod.

The two carburetor throttle shaft levers are connected by a cross shaft actuated by the accelerator linkage. Both carburetors receive fuel through lines connected to a T-shaped outlet fitting on the centrally located fuel pump. A center connection outlet on this fitting furnishes fuel to the gasoline fed car heater. A vacuum balance tube is connected between the intake manifolds below the mounting flanges of both carburetors. This tube has a mid-point connection to provide a source of vacuum for the automatic choke piston and the vacuum modulator on the Powerglide transmission. Both of these units need the most constant vacuum possible for efficient operation and therefore vacuum is taken from both cylinder banks instead of from only one side.

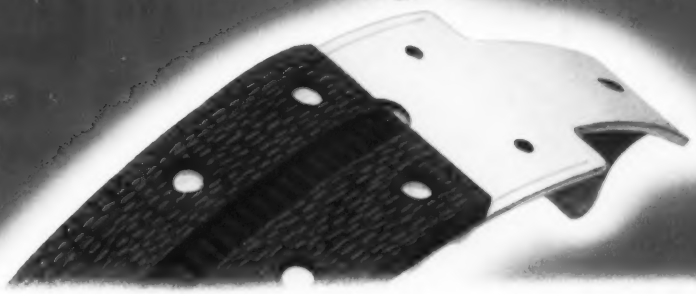
The air horn and air cleaner assembly, located at the top of the engine, is separated from the carburetors, but is definitely part of the carburetion system. The automatic



Over-all view of the Corvair carburetion system. The two carburetor throttle shaft levers are connected by a cross shaft. The accelerator rod actuates this cross shaft so that any movement of the accelerator pedal should be a proportionately equal movement of each carburetor throttle lever.

NOW FROM Grey-Rock

New



COPPER-WOVEN BRAKE LINING

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- PRACTICALLY ELIMINATES FADE
- GIVES LONGER SERVICE LIFE
- TESTED UNDER MOST SEVERE CONDITIONS
- BIGGEST BRAKE LINING IMPROVEMENT IN YEARS

To help eliminate the tremendous heat developed by the smaller brakes on today's heavier cars traveling at higher speeds, Grey-Rock now has a new improved woven-molded combination Balanced Brakset for Bendix brakes in which the woven segment is made with copper wire.

Because copper is an excellent conductor, it gets rid of excessive heat at the braking surface by carrying some of the heat through the lining into the brake shoe, which helps dissipate the heat.

The new copper-woven lining is combined with an improved molded lining. Result: Grey-Rock Balanced Braksets keep their full braking power after repeated brake applications, provide longer service life.

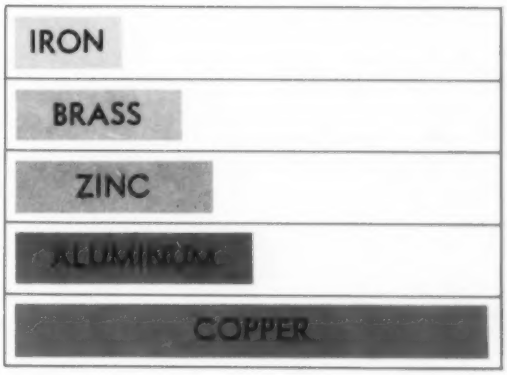
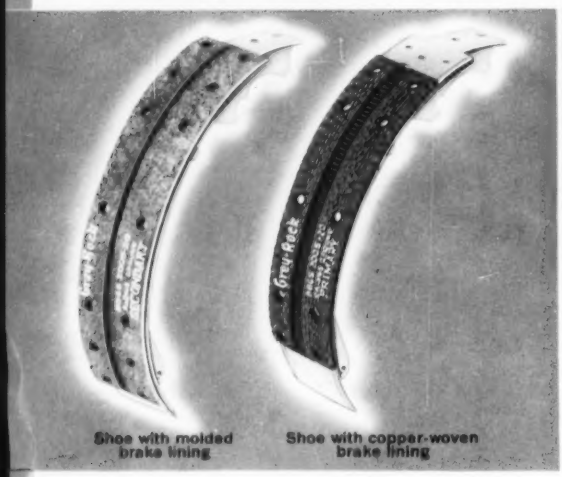


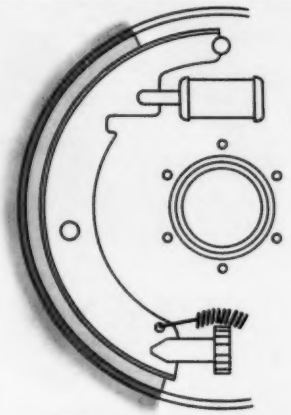
Chart shows relative speed at which common metals conduct heat. Of these, copper conducts it fastest—nearly twice as fast as aluminum, almost 5 times as fast as cast iron.

Here's how brake-destroying heat attacks conventional linings —and why Grey-Rock Balanced Braksets with copper-woven linings operate at cooler temperatures, last longer

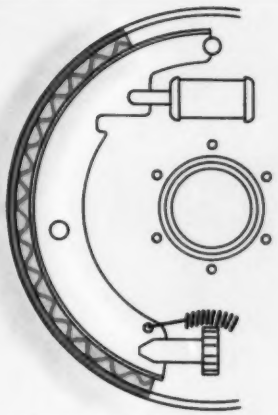


Shoe with molded brake lining

Shoe with copper-woven brake lining



Molded lining dissipates heat unevenly through drum only.



Copper-woven lining dissipates heat evenly through drum and shoe

The enemy of brake efficiency is excessive heat. Braking friction builds heat at the lining surface. Trapped heat often can't be dissipated fast enough in conventional linings to prevent fade and rapid wear.

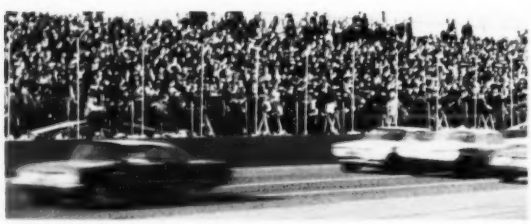
Copper wire in the new, improved Grey-Rock woven lining conducts a large portion of the heat down into the brake shoe. Drum and shoe act as heat reservoirs . . . both dissipate the heat. Result: brakes run cooler even under the most severe braking conditions, reducing fade and preventing excessive wear.

New linings outstanding in tests from coast to coast!

In dramatic proof of their unusual durability and low fade characteristics, Grey-Rock's new woven-molded combination linings have successfully passed the test in hundreds of problem cases all over the country.

Examples:

The fast-driving owner of a heavy car couldn't get more than 4000 miles out of any set of lining. Grey-Rock's new Copper-Woven-Molded combination was installed and was still in excellent condition after 6000 miles of the same hard driving.



State police cars patrolling high-speed areas report excellent results with the new linings.

Leading NASCAR drivers have used the new Grey-Rock combination in fast stock car competition with complete satisfaction.

Hundreds of cars have proved in thousands of punishing miles the astonishing ability of Grey-Rock Copper-Woven-Molded Balanced Braksets to deliver faster, surer, safer stops . . . and do it longer.

Grey-Rock keeps you out in front!

The new Copper-Woven-Molded combinations are another example of how Grey-Rock gives you the edge over competition. Grey-Rock research and brake lining development mean more satisfied customers, more sales, and more profits for you.

Use these new, improved linings and Grey-Rock's complete merchandising plan, plus the big new consumer advertising program, to push your brake service sales and profits to a new high. Grey-Rock Division of Raybestos-Manhattan, Inc., Manheim, Pa.

Only **Grey-Rock** *makes* **BALANCED BRAKSET LININGS**

BALANCED BRAKSETS • TRUCKSETS • BRAKE BLOCKS • VEE-LOK® CLUTCH FACINGS • AUTOMATIC TRANSMISSION PARTS

You Can't Buy a Better Brake Lining to Save Your customer's Life

choke operates in the air horn assembly with the choke valve located between the air intake pipe and the air horn assembly. Thus, during a cold start or warmup, air flow through the system is regulated before it reaches the air cleaner, and indirectly, the automatic choke thermostatic coil. Air from the cleaner passes through a tube routed alongside the engine manifold where it is heated on its way to the automatic choke housing. Outside air passes through the air horn and air cleaner, through the air tubes to both carburetors.

The automatic choke is a modifier type which mounts the choke thermostatic coil on a rotating post extending through the choke housing cover. This post is connected by a lever to the throttle cross shaft, and is used to control the choke valve to prevent "loading up" and excessively rich mixtures under certain operating conditions during the warmup period. The choke, choke modifier, and fast idle linkage are all mounted on the air horn assembly and are linked to the throttle cross shaft through the modifier operating lever.

When the throttle is opened fairly wide with the engine under load (such as climbing a steep hill), vacuum pull on the choke piston is lessened reducing its ability to hold the choke valve open. If the engine is cold, the thermostatic coil will tend to close and "load" the engine because the balance between the thermostatic coil and the vacuum piston is upset. Also, under load conditions, vacuum, drawing heat to the thermostatic coil housing, may not be sufficient to heat and relax the coil before "loading up" occurs.

The choke modifier is at its leanest when the throttle is approximately 45 deg. open and will gradually enrich the mixture as the throttle moves to wide open position. Engine fuel mixture demands at different speeds and operating temperatures are therefore more closely satisfied. Operation of the various H carburetor circuits is essentially the same as in the BC models.

If the accelerator pedal and pedal rod are not correctly aligned, the pedal may be too close to the floor at idle position preventing full throttle opening, or at the other extreme, the pedal may be in an almost vertical position at idle.

A minor misalignment between the pedal and rod could be corrected by linkage adjustment, however, the linkage lacks sufficient adjustment range to provide proper pedal position if the pedal-rod misalignment is substantial. Unfortunately, this misalignment will not show up until linkage adjustment is attempted, making pedal removal necessary.

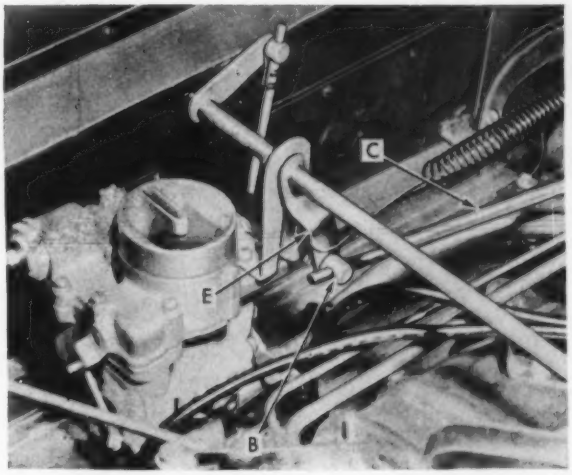
For correct pedal-rod assembly before the pedal is installed in car, proceed as follows:

1. Lay pedal face down on flat surface (bench or table top) as shown, with serrations on rod held firmly against pedal bracket. Position rod to obtain a 1-11/16" gap between flat surface and underside of pedal rod pin.

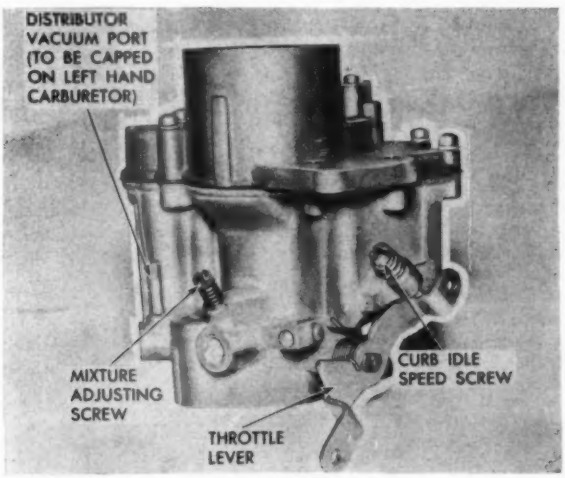
2. Mark rod and bracket to permit realignment in same position when parts are assembled in a press.

3. Install rod support with two bushings on pedal, align reference marks and press rod into pedal. Inner leg of pedal should seat against nylon sleeve after parts are pressed together.

4. Attach self-locking nut and install pedal assembly in the car.



Accelerator pedal adjustment to the cross shaft involves changing the length of rod (C) by threading swivel (B) either "in" or "out" on the rod until it fits into the hole in the lever (E). Accelerator pedal must be held in an exact position during adjustment.


DISTRIBUTOR VACUUM PORT (TO BE CAPPED ON LEFT HAND CARBURETOR)
MIXTURE ADJUSTING SCREW
CURB IDLE SPEED SCREW
THROTTLE LEVER

Corvair carburetors (Rochester Model "H") are almost identical. The difference is in the distributor vacuum port which is capped on the left-hand carburetor, but free to be connected to the distributor vacuum line on the right-hand carburetor.

ACCELERATOR PEDAL LINKAGE ADJUSTMENT

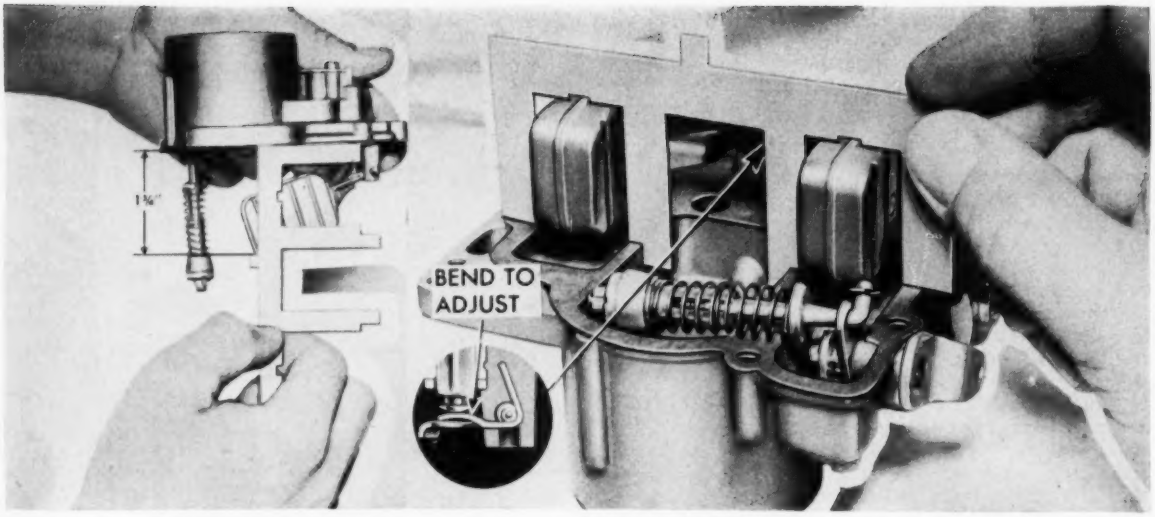
Where accelerator pedal and rod are correctly aligned, but the throttle cannot be opened wide, or the choke unloader and fast idle linkage do not operate correctly, accelerator linkage adjustment may be necessary. To adjust accelerator linkage, proceed as follows:

1. (Under car) Remove mudguard over idler lever on side of transmission and disconnect lower or horizontal rod from lever.

2. (Engine compartment) Disconnect accelerator rod from cross shaft operating lever at left side and pull rod up to wide open throttle position (through detent for Powerglide or against stop for standard transmission cars).

3. (Engine compartment) Turn cross shaft lever to wide open position (carburetor throttle lever against stop) and adjust swivel on accelerator rod to align with hole in operating lever. Then lengthen rod by backing off swivel five full turns and reconnect to lever.

4. (Inside car) Position accelerator pedal by placing a wood block between toe end of pedal and floor mat (thickness—1¼" for Powerglide, 1"



Left, float drop should be established through use of the correct gauge, but the adjustment can be made without a gauge by establishing a 1¾" distance between the air horn gasket to the bottom of the float. A gauge is available for accurately adjusting the carburetor float level. The gauge (right) permits float alignment as well as level adjustment, and, consequently, should be used whenever making these adjustments to the float. The float level can be set correctly by bending the tang under the float needle until a distance of 1-13/64" is established from the top of the float to the air horn gasket.

for standard transmission) or floor pan (thickness—2" for Powerglide, 1¾" for standard transmission).

5. (Under car) Hold idler lever on transmission in wide open throttle position (through detent on Powerglide cars) and adjust horizontal rod swivel to align with hole in lever. Connect rod and install mudguard.

6. Remove wood block under accelerator pedal and check pedal and linkage for correct operation with the engine running.

SYNCHRONIZING CARBURETORS

1. Detach automatic choke air supply hose from base of air cleaner and remove air cleaner wingnut. Release intake air tube spring clamps at both carburetors and lift air cleaner and air tubes off air horn assembly as a unit.

2. Remove retainer clip from throttle lever on right hand carburetor and disconnect link rod.

3. Remove retainer clip from left hand cross shaft throttle lever and detach carburetor link rod swivel from shaft lever.

4. Back off throttle speed screws on both carburetors so that throttle valves can be fully closed.

NOTE: Disconnect cross shaft throttle return spring, and in turn, hook it temporarily between each carburetor throttle lever and some adjacent engine part to hold throttles closed when adjusting idle speed screws.

5. On each carburetor, place a .003" feeler blade between idle speed adjusting screw and throttle lever. Turn screw down until it just holds the feeler; withdraw the blade and turn screw in one complete turn. After speed screws on both carburetors have been adjusted, reconnect the throttle return spring in its original location.

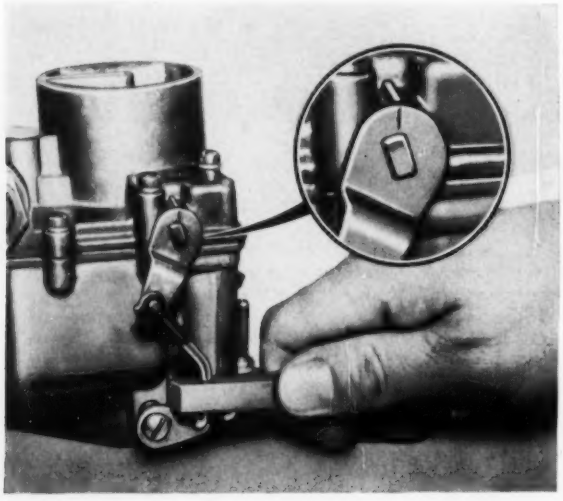
CAUTION: MAKE SURE THAT THE THROTTLE LEVER SCREW ON THE FAST IDLE LINKAGE IS OFF THE CAM BEFORE PROCEEDING WITH THE NEXT STEP.

6. Connect right hand throttle link rod to carburetor lever and install retaining clip.

7. Hold left hand cross shaft lever up as high as it will go to keep right hand carburetor throttle closed.

8. Lift left hand link rod to keep its carburetor throttle closed and adjust the rod swivel so that it freely enters hole in cross shaft lever. Install retaining clip, and install air cleaner and tubes.

9. Carburetors are now synchronized. Additional curb idle adjustments must be duplicated on both carburetors to maintain their synchronization.



With idle speed adjusting screw backed-off allowing throttle plates to close completely, the scribe mark on the pump rod lever should line up with the mark on the air horn casting. Bend rod to obtain correct adjustment.

IDLE SPEED AND MIXTURE ADJUSTMENT

1. Remove choke vacuum hose from vacuum balance tube fitting and install a short jumper hose and adapter "tee" between tube fitting and choke hose. (Adjustments will be incorrect if settings are made with choke hose off).

2. Connect vacuum gauge hose to adapter "tee" and connect tachometer to engine.

(Continued on page 46)

Unusual Design Pistons like these should be finished at the factory

Finishing pistons like you see here is a difficult problem, even in the best equipped jobber shops. First, their unusual design makes these pistons hard to chuck in the grinder. Second, finishing to the more exacting dimensions specified for these intricate designs requires special equipment that is seldom available locally.

Third, and equally difficult for local finishers, is the coating that guards against scuffing during break-ins. That's why Allied has made factory-finished pistons available to you locally, precisely dimensioned to correct clearances and contours, with aluminum pistons tin-coated—cast iron pistons lubrite finished for safe break-in protection.

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(Continued from page 44)

NOTE: Air cleaner must be installed when idle adjustments are made.

3. With engine running at normal operating temperature and choke fully off, adjust idle speed screw on each carburetor the same number of turns to give 450-500 rpm for standard transmission cars and 500 rpm in Drive for Powerglide cars.

CAUTION: DO NOT FORCE MIXTURE SCREWS AGAINST VALVE BOTTOMS OR DAMAGE MAY RESULT.

4. Adjust idle mixture screws on both carburetors to give the highest steady vacuum indication at specified idle speed. Vacuum gauge should read between 14 and 18 inches.

5. Repeat steps 3 and 4 if necessary for fine adjustment.

FLOAT LEVEL AND DROP ADJUSTMENTS

1. Remove bowl cover with gasket from carburetor.

2. Invert cover and place float level gauge over floats as illustrated. Float level dimension (top of float to gasket) is 1-13/64″ if measured without float gauge.

3. Bend tang located over float needle valve until both floats touch top of gauge. Float bottoms should parallel bowl cover gasket surface within 1/32″. Check alignment by moving gauge along float length while keeping it in a vertical position.

4. Floats must be centered between gauge legs. Bend float arms horizontally if adjustment is necessary. Tilt float cover assembly sideways to make sure that floats do not rub or touch gauge legs. Recheck float level if float arms are adjusted.

5. Turn bowl over to upright position and measure distance from gasket to bottom of float with gauge as illustrated. Float drop dimension should be 1¾″ if gauge is not used. Bend tang at end of float hinge arm to adjust drop setting. Recheck float level after this adjustment.

6. Install bowl cover and gasket.

7. Synchronize and readjust carburetors.

PUMP ROD ADJUSTMENT

1. Back off idle speed screw on carburetor until throttle valve is completely closed.

2. Hold throttle valve closed and check whether scribe mark on accelerator pump lever aligns with mark cast into bowl cover as illustrated.

3. If necessary, bend pump rod, using a rod bending tool to align the marks.

4. Synchronize and readjust carburetors.

FAST IDLE AND UNLOADER ADJUSTMENTS

1. Synchronize carburetors and adjust for correct idle speed.

2. Press accelerator pedal to floor and check carburetors for wide open throttle.

NOTE: If wide open throttle position is correct at both carburetors, proceed with next step. If not, adjust accelerator linkage or pedal and rod as required.

3. Insert a ⅛″ spacer between the right hand carburetor throttle lever and speed adjusting screw.

4. Remove retaining clip and disconnect fast idle link swivel from fast idle lever.

5. Turn fast idle adjusting screw down until 5/16″ of the screw projects beyond the threaded part of the lever.

6. Turn fast idle cam clockwise (viewed from left of vehicle) until fast idle screw rests on highest portion of cam as illustrated.

7. With idle screw and lever held in this position, adjust the link swivel to align the swivel pin with the hole in the fast idle lever. Install swivel and retaining clip.

8. Remove ⅛″ spacer at throttle lever. Linkage clearance will reduce the clearance at this point. Readjust fast idle adjusting screw to restore the

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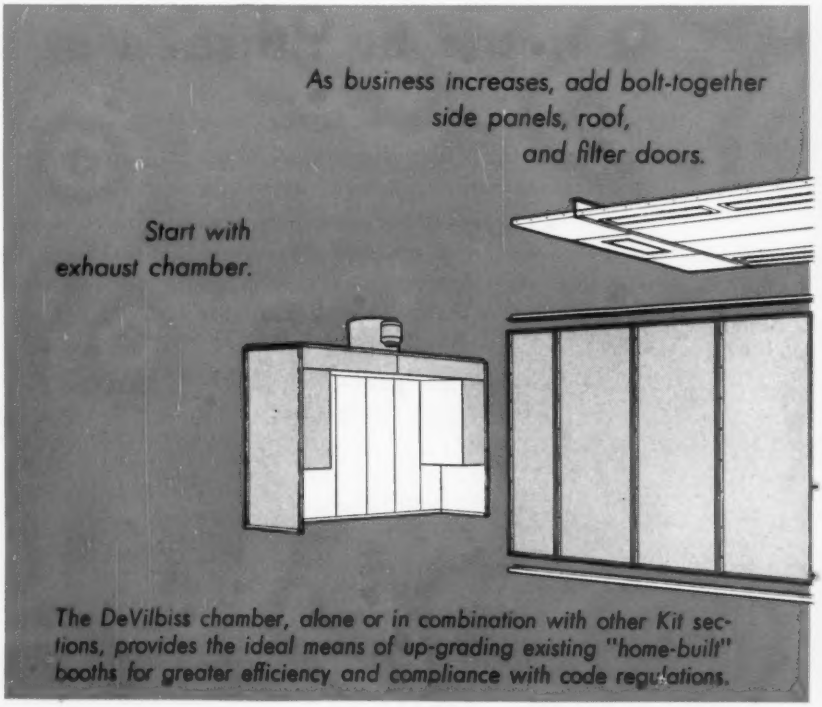
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1/8" clearance at the throttle lever. This setting will provide the correct fast idle speed.

9. Hold accelerator rod in wide open position and check choke unloader operation.

10. With unloader actuated, clearance between choke valve and adjacent air horn wall should be 1/8". If incorrect, adjust by bending unloading tang on fast idle cam.

AUTOMATIC CHOKE (MODIFIER) ADJUSTMENT

Normal choke modifier setting puts the index pointer at the index mark when the throttle is in idle position. If the fast idle does not release when the engine is warm or fuel economy is poor, choke modifier adjustment may be needed.

To adjust the choke modifier, the modifier lever must be connected to the cross shaft lever and the carburetor throttles in curb idle position. Carburetors must be adjusted for correct idle speed. This is done as follows:

1. Loosen lever and pointer screw.

2. Allow thermostat coil to return to free position.

3. Rotate pointer clockwise and align it with scribed mark on choke cover.

NOTE: Choke modifier lever must point toward rear of car.

4. Tighten screw to lock lever and pointer in this position.

AIR CLEANER (CLEAN EVERY 2,000 MILES)

To clean, remove filter element from its metal support screen, submerge in *clean* solvent, rinse and remove excess solvent by squeezing. Submerge element in engine oil (SAE 10W) and squeeze out excess. Reinstall element in support and place assembly in air cleaner, using care in positioning element to prevent creasing or folding under the upper and lower sealing lips. When installing assembly, be sure that the air horn gasket is in place.

ACCELERATOR LINKAGE

The accelerator pedal rod forms a pedal pivot axle and linkage lever. The lever end extends through the floor pan and connects to a push rod located between the pedal lever and an intermediate lever. This intermediate lever reverses rod motion and acts as a ratio lever.

A second rod connects the intermediate lever directly to the TV lever of Powerglide equipped cars or to an idler lever on standard transmission cars. This second rod is adjustable on Powerglide models to get downshift with wide open throttle.

A third rod is connected to the top of the idler on TV lever to operate the cross shaft on the engine. This rod is also adjustable at its upper end. This system is solid from end to end to provide a manual pull back safety factor that permits the accelerator to be pulled back to close the throttles if the system should jam.

In step-by-step fashion, the adjustment and synchronizing procedure sounds like quite a chore. Actually, it can be performed quickly, and the results are always right the first time *if the steps are followed correctly.* Correctly adjusted and synchronized, the Corvair twin carburetors allow Chevrolet's "compact" to deliver top over-all performance.

When Replacing Filter Be Sure Valve Is Open

Before installing a new oil filter (Part No. 1851658) on the Valiant or 225, 361 and 383 cu. in. Plymouth engines, it is essential that the rubber drain back valve on the filter be free to permit the circulation of engine oil. This can be done by pressing a blunt instrument into the four holes in the base of the filter to assure clear passages.

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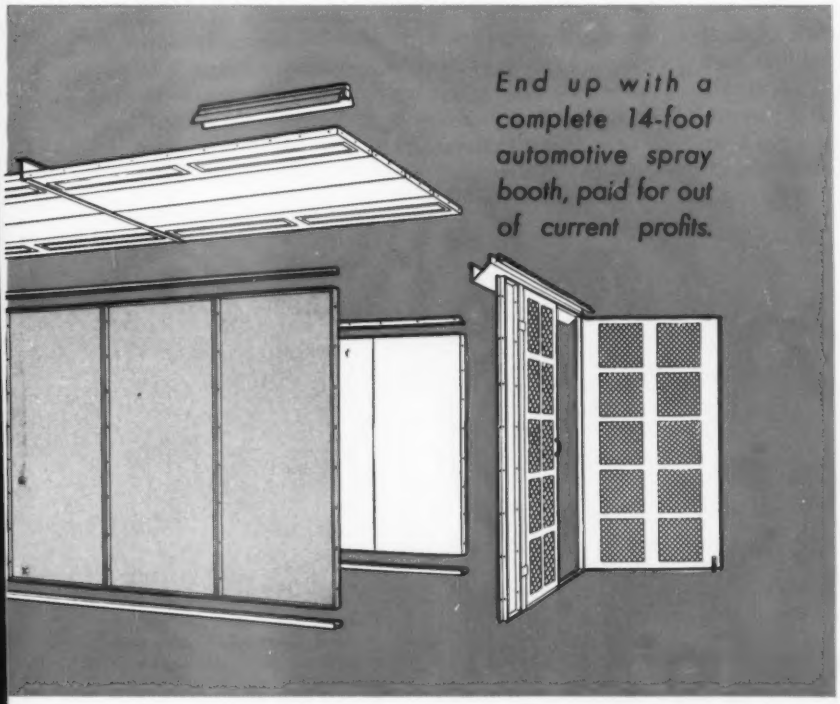


Servicing "compact" car brakes

A series of articles dealing with the service requirements and peculiarities to be found in the braking systems used on today's "compact" cars.

Part II—The Falcon

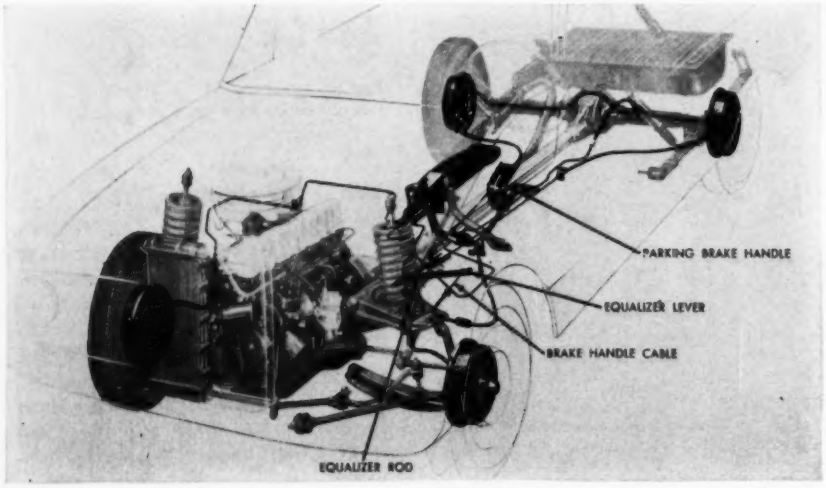
• FOR THE BRAKE MECHANIC who has been servicing standard-type hydraulic brakes without too much trouble, Falcon brakes should bring on few, if any, new headaches. The Falcon system is conventional in almost every respect. In fact, the Falcon brake system could be called a scaled down version of the conventional Ford design.

While Falcon brake components are not interchangeable with Ford brakes, the only reason for this is a difference in size, not in design and constructions. (Falcon's system uses smaller sized components.)

CONSTRUCTION

Falcon uses the duo-servo, single anchor type of four wheel hydraulic brake. Each wheel has two brake shoes (a primary and a secondary). A single wheel cylinder, incorporating two opposing pistons, actuates both the brake shoes on any one particular wheel. Wheel cylinder's inside diameter is 1.062" for the front wheel cylinder, and 0.8125" for the rear wheel cylinder. Brake linings are 1½" wide on the primary and secondary shoes used on the rear wheels, and 2¼" wide for both primary and secondary front wheel shoes. Primary shoes . . . for all wheels . . . can be identified easily because they are approximately 2" shorter in length than the secondary shoe linings. The length of the actual shoes is identical, just the lining length varies between primary and secondary.

The brake drums are made of cast iron, with an inside diameter of 9". Drums of identical diameter are used on both front and rear wheels. As in other similar brake systems, not more than .060" should be removed from the braking surface of the drum during reconditioning. If out-of-round, scoring, warping, bellmouthing, etc. conditions cannot be removed by taking out up to .060", the drum should be replaced with a new one. Remember, a .030" cut taken by the lathe cutting tool while the drum is rotating results in an overall inside diameter increase of .060". **DO NOT** take a .060" cut, or any com-



Falcon's parking brake system is hand operated. Cables running from the operating lever actuate the rear wheel brakes for parking purposes. Adjustment is made at the equalizer lever and at the cable yoke.

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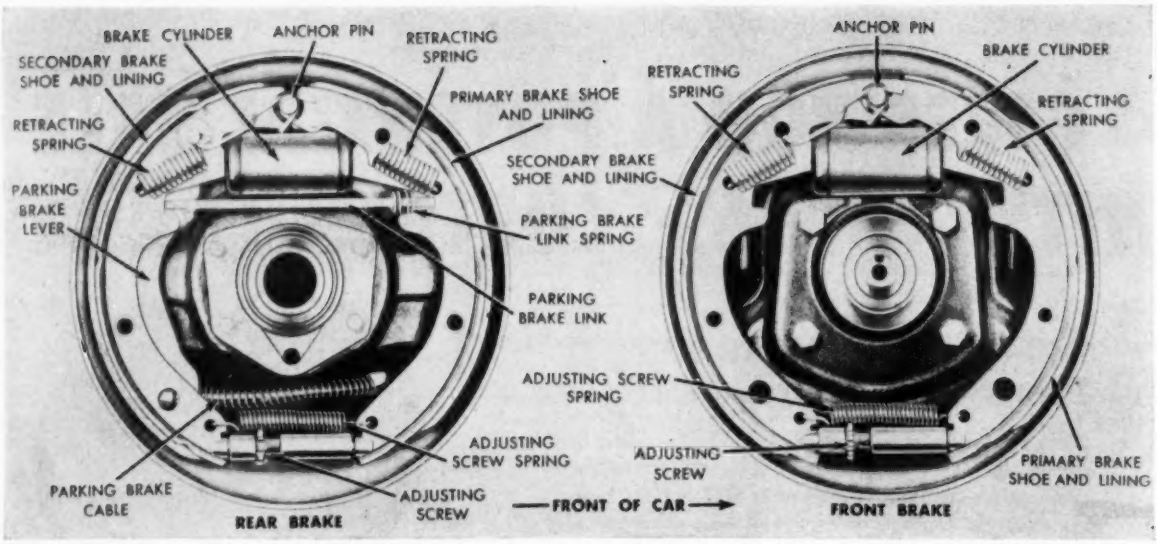
ROCHESTER CARBURETORS



Both front and rear brake assemblies for the Falcon might well be called a scaled down Ford system. Field experience seems to indicate that very little chronic trouble has been experienced with the Falcon brake. Brake assemblies are conventional.

bination of cuts that total up to .060". If this is done, the braking efficiency of the drum will be seriously reduced because of the excessive metal loss.

The adjusting screw springs, return springs and adjustment facilities are all identical in appearance and function to the conventional Ford design. The parking brake actuates the rear wheel brakes only, and it, too, is identical to Ford's conventional parking brake system.

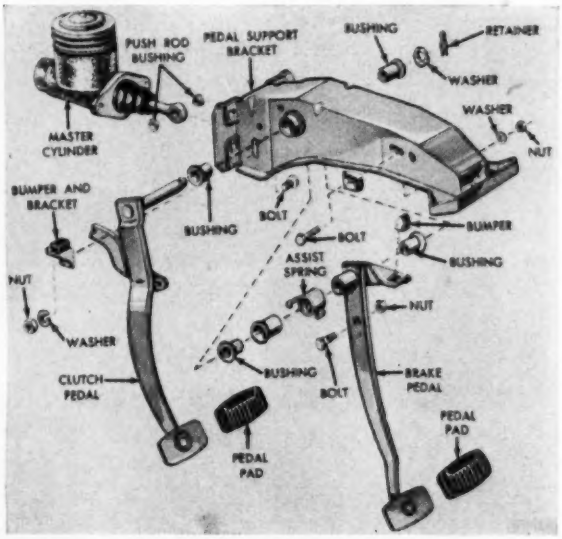
WIDE MOUTH MASTER CYLINDER

Falcon's master cylinder is mounted on the firewall, and is readily accessible for inspection and/or service when the hood is raised. A new feature of the master cylinder is the extra-large filler cap. The cap can be removed or replaced by hand, much like taking off or putting on the lid of an ordinary mason jar.

While this type of filler cap is welcomed by most mechanics, it does have a slight handicap in that it's possible for much more foreign matter to fall into the master cylinder reservoir than it is when a smaller filler cap is used. For this reason, care should be exercised when removing or replacing the Falcon master cylinder cap. It's most important to clean away all loose dirt and grime before removing the cap. This cleaning procedure has always been recommended for other master cylinders, but it's especially important on the Falcon.

The Falcon master cylinder is operated by a suspended brake pedal, so familiar to Ford products. Pedal free-play should be between 5/16" and 7/16". Free-play is adjustable from within the car by lengthening or shortening the master cylinder push rod as required. Brake pedal reserve should not be less than one-half the total travel from full pedal height (brakes released) to the toe pan. Excessive pedal travel can be corrected by a brake adjustment or brake reline. A quick check for this is to pump the brake pedal several times to see if the pedal "comes up." If it does, the brakes require only an adjustment to obtain satisfactory pedal. If the pedal does not "come up" either the brakes need a reline, or the fluid level in the master cylinder is low. Correct fluid level is ½" from the top of the fluid reservoir.

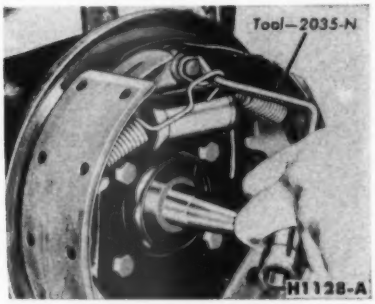
(CAUTION: As with any late model vehicle, use only heavy-duty brake fluid. If even a small amount of moderate-duty or light-duty fluid is added to the reservoir, the safety specifications



Falcon uses suspended brake and clutch pedals. Brake pedal free play is adjustable by varying the length of the master cylinder push rod. Bushing replacement on either the clutch or the brake pedal is an easily performed service operation.

for the entire hydraulic braking system will be dangerously reduced. If this ever happens, the entire system will have to be drained, flushed with denatured alcohol, bled, and refilled with heavy-duty brake fluid.)

If none of the above corrections bring the brake pedal up to specifications, either the master cylinder is defective or there is a leak in the hydraulic system. To check the master cylinder, pump the brake pedal several times to bring the pedal up as high as it will come, then apply the brakes and hold them in the applied position for about 30 seconds. If during this period the pedal "falls away" the master cylinder check valve is defective or there is a fluid leak in the system. If the master cylinder reservoir indicates no fluid loss anywhere in the system, the master cylinder itself should be removed and overhauled or exchanged. Extensive owner mileage and careful field survey indicates very little chronic trouble with Falcon brakes. It's safe to say, therefore, that little quality was lost in the shrinking down process to make the regular Ford brake fit the Falcon. About the only complaint of any consequence has been one of isolated cases on brake squeal or chatter. The best cure for these conditions is a truing up of the brake drums with a dependable drum lathe. Anti-squeal springs are available for the Falcon drums. These springs are easy to install and do a good job of removing minor objectionable squeals.



Brake retracting springs are removed with a brake spring tool. When the brake assembly is properly installed, it should be free to move slightly on the backing plate pads.

When brake pedal travel has become excessive, and inspection reveals it can be corrected by a brake adjustment, the following procedure should be used:

1. Check fluid level in master cylinder. Correct as necessary.

2. Raise the car on a hoist or lift so that all four wheels are completely off the ground.

(NOTE: Brake drums should not be hot when adjusting shoe clearance, as they will have a tendency to bind as the drums cool and contract.)

3. If the car is on a frame lifting hoist (wheels hanging free), check the parking brake cables to make sure enough slack is present to prevent binding the rear brakes.

4. Remove the adjusting slot covers and use the standard spoon type brake tool inserted through the brake adjusting slot, turn the star wheel inside the drum until the brakes lock snugly. Then, back off the adjustment approximately 4 to 6 notches, or until the tire and wheel revolves freely again. Repeat this procedure on the remaining wheels.

(CAUTION: BE SURE TO REPLACE THE RUBBER ADJUSTING SLOT COVERS AFTER BRAKE ADJUSTMENT IS COMPLETED.

A standard-type adjustment slot is provided in the backing plate through which brakes are expanded with a brake spoon. Be sure to replace slot covers as dirt in the braking area causes rapid wear and noise.

EARLY BRAKE SHOE FAILURE, AND BRAKE SQUEAL CAN RESULT IF EVEN A SMALL AMOUNT OF MUD AND WATER IS ALLOWED TO ENTER THROUGH THE OPEN SLOTS.)

Since Falcon brakes employ a non-movable anchor pin, no other adjustment to the brake shoes is required (or possible, for that matter).

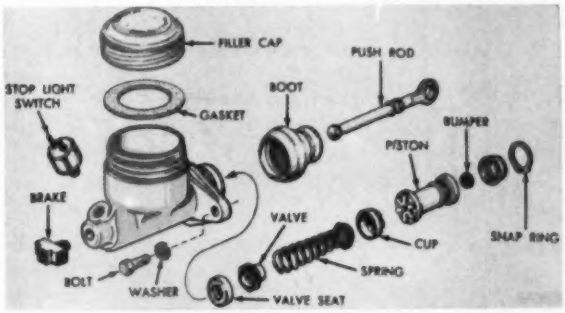
6. With the car on the ground, check the parking brake. In most cases, the rear wheel brake shoe adjustment already completed will also provide the correct parking brake adjustment.

PARKING BRAKE

The parking brake used on the Falcon is hand operated, and employs two separate cables. One cable is connected to the parking brake handle with the equalizer lever. The other cable is connected to the equalizer lever and yoke, and through the yoke to each of the rear wheels.

If, after the rear wheels have been adjusted, the

(Continued on page 81)



An extra wide filler cap features the Falcon master cylinder which is accessibly located. The wide mouth cap opening is more prone to admit foreign matter into the reservoir. Clean away all dirt and grime before the filler cap is removed.

The Come-hither . . .

Bring them in with the Delco Coin Caddy, a handy little gadget that clips to the sun visor of your customer's car, carries small change for parking meters and phones. A colorful pair of signs (one weatherproof) invites prospects in to get a free battery check and FREE coin caddy!

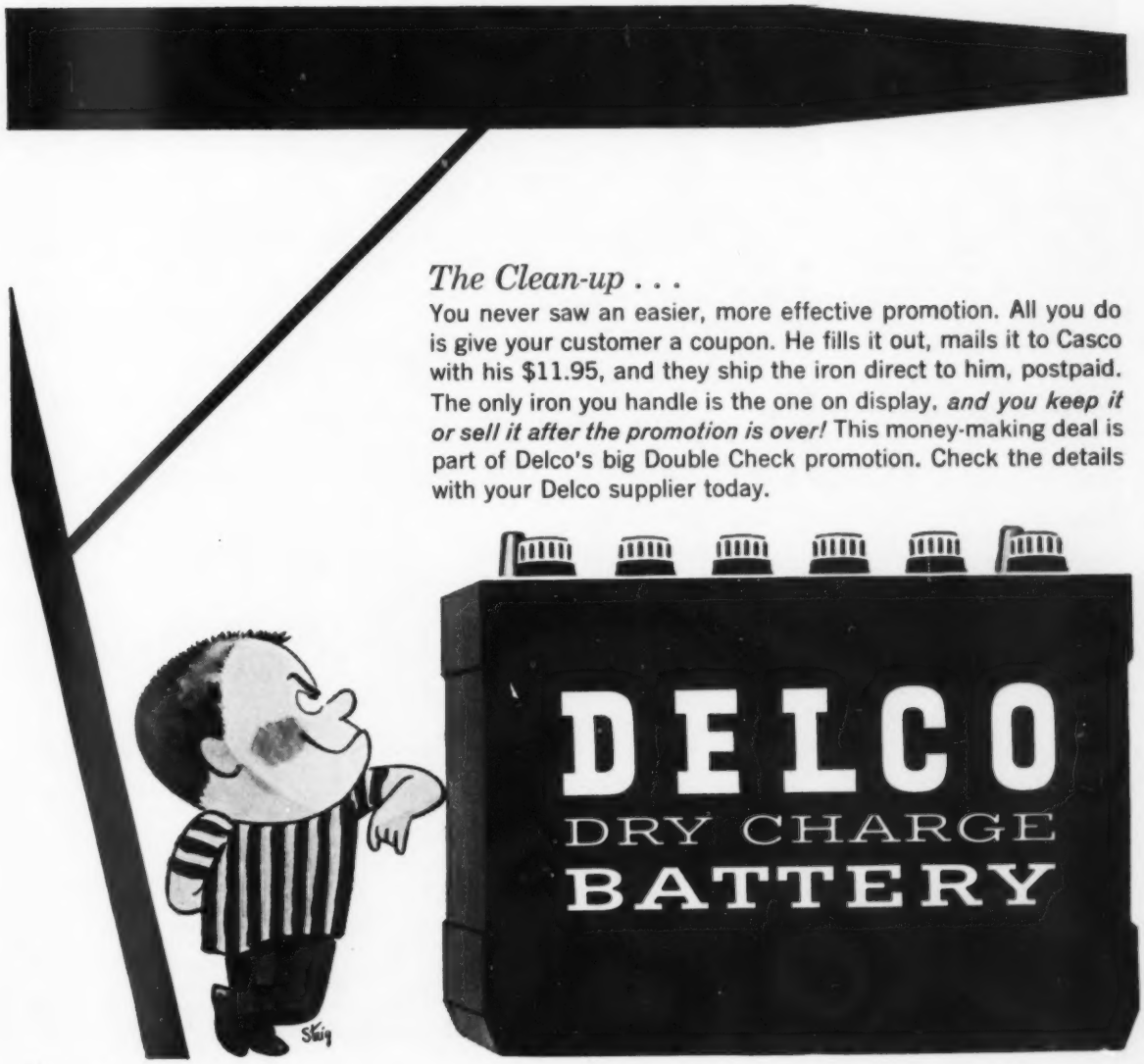
FREE
GIFT WITH
FREE
BATTERY CHECK

The Clincher . . .

A Casco Sprinkle Spray Steam Iron, brand new on the market. Every customer who buys a Delco Battery from you may have this wonderful new iron for only $11.95!

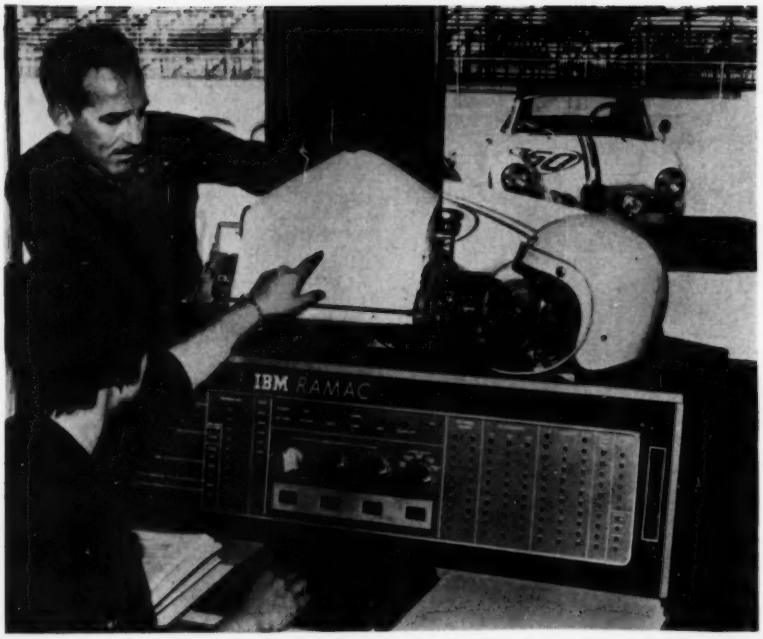
QUALITY BUILT BY DELCO-REMY . . . DISTRIBUTED NATIONALLY THROUGH GM U-M-S

DELCO PUTS STEAM HEAT ON BATTERY PROFITS

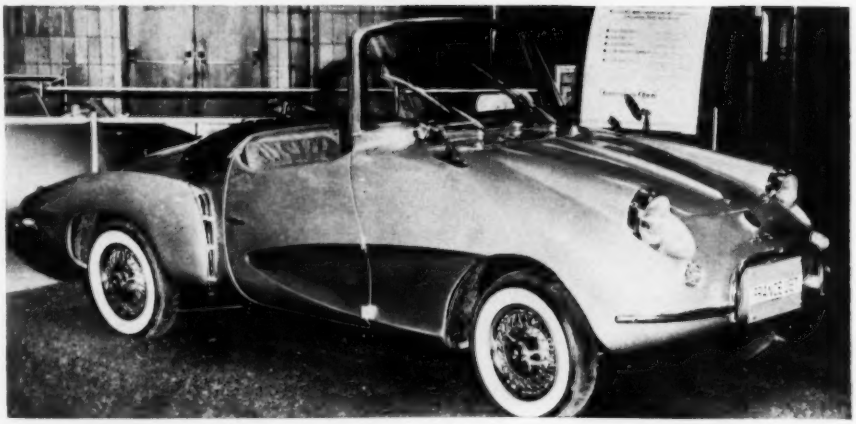


The Clean-up . . .

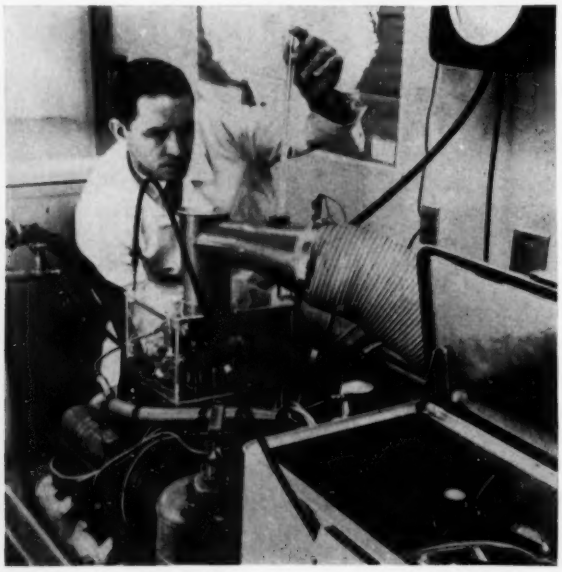
You never saw an easier, more effective promotion. All you do is give your customer a coupon. He fills it out, mails it to Casco with his $11.95, and they ship the iron direct to him, postpaid. The only iron you handle is the one on display, ***and you keep it or sell it after the promotion is over!*** This money-making deal is part of Delco's big Double Check promotion. Check the details with your Delco supplier today.



Racing driver Louis Comito checks test report printed by the IBM RAMAC 305 data processing system installed to score the recent 12-hour Sports Car Endurance Race at Sebring, Fla. For the first time in the international auto racing classic it was possible for drivers, pit crews and spectators to know the official standings of all cars in all classes while the race was in progress. RAMAC computes and prints out complete race standings of over 60 cars and drivers in minutes, compared with hours of involved manual calculations previously required.



The France Jet, a sleekly-styled little French two-seater sports car, will soon add new elements of safety, economy and roadability to the American road scene. The body is constructed of fiberglass reinforced with aluminum, is dent-proof and shockproof, and four-wheel hydraulic brakes give it maximum stopping power. Safety belts are included with purchase. A central tube chassis with cross bearers for the body provide high stability. The engine is one-cylinder, four-cycle, built of pressure cast aluminum.

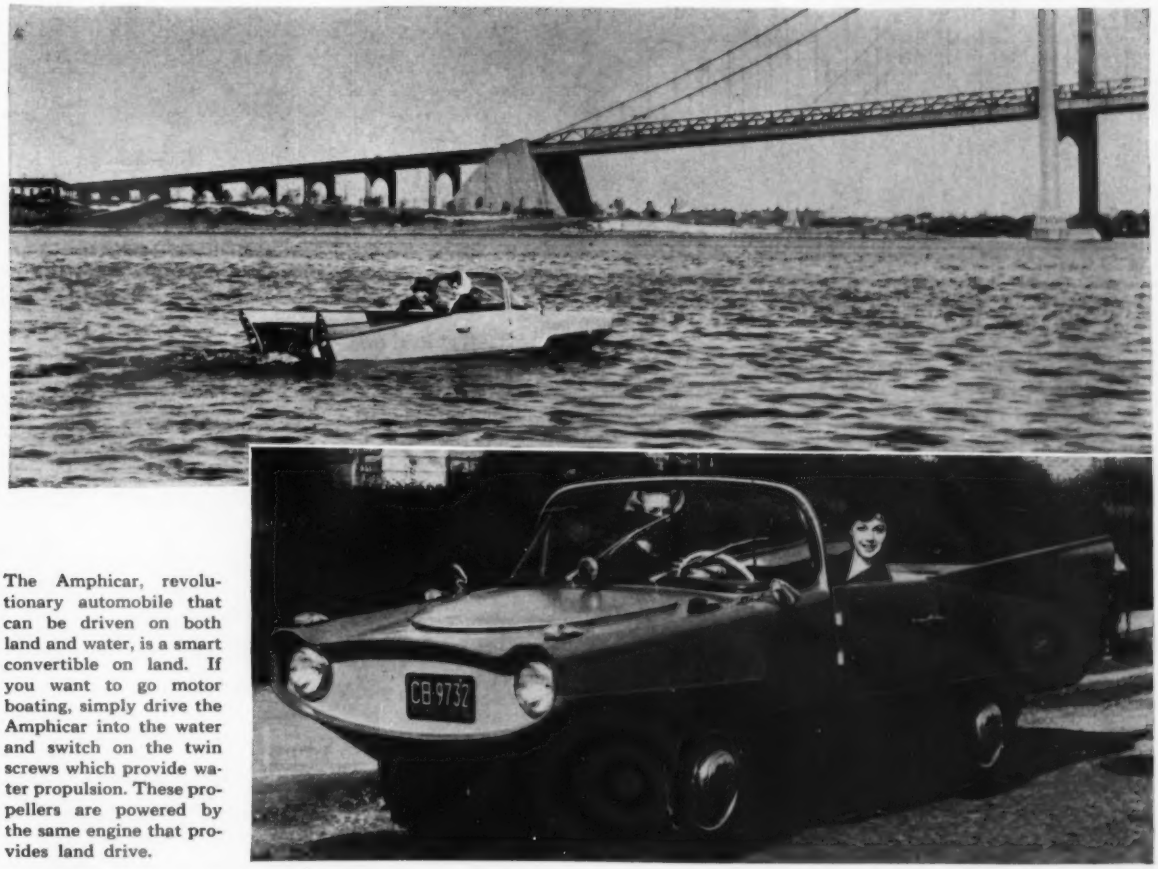


PHOTOS

FROM HERE AND THERE

Non-stall gasolines for safer driving especially during cold weather are studied at Union Carbide Chemicals Company's new Technical Service Laboratory. Scores of gasoline additives were evaluated under similar stringent carburetor-icing conditions. This modern facility is designed to simulate stop-and-go city driving in chilly, humid weather conditions most likely to cause icing. Also evaluated is the effect of the additive on engine corrosion, gasoline octane, combustion deposits, and gasoline storage stability.

Burr E. Giffen, 74-year-old originator of the Fisk Boy and the "Time To Re-Tire" slogan, re-creates his original sketch in the United States Rubber Co. exhibit hall in Rockefeller Center, New York. In the background is a nine-foot statue of the well-known trade-mark. The sleepy tousle-head boy has been finding his way to bed by candlelight for 54 years.



The Amphicar, revolutionary automobile that can be driven on both land and water, is a smart convertible on land. If you want to go motor boating, simply drive the Amphicar into the water and switch on the twin screws which provide water propulsion. These propellers are powered by the same engine that provides land drive.

Do it from the outside

MOST PEOPLE who buy new cars sooner or later manage to put dents in them. Although they expect you, the body shop operator, to remove these dents (particularly the small "parking lot" variety) for a reasonable price, it is hard for the average car owner to understand that a bill for $100 *can be reasonable* for removing a dent the size of a dinner plate—if half the car has to be dismantled to enable you to get at the damage.

One body man (Al Awot), tired of "consoling" customers who almost fainted when handed their repair bill, decided there must be an easier way to handle these small dents in hard-to-get-at places. His solution—a simple to use, inexpensive but effective body tool which he calls the Spaulding Dent Remover. According to Mr. Awot, "This tool is so simple to use that anyone who can take a hammer and pull a nail out of a board can remove dents with it."

BASICALLY AN "L" SHAPED IRON

The tool is basically an "L" shaped iron with a foam rubber faced pivot pad bolted to it at the bend of the "L". For shallow "pop out" dents, of the type so common to door panels, all you do is screw the neoprene cup to the end of the bar, stick the cup to the panel at the center of the dent and apply a little leverage to the handle of the tool; the dent "pops" out and the job is done.

On deeper dents, a flat, rigid body file is used to mark off the damaged area and make it easier to define visually. The center, or in the case of a crease, the line along the deepest part of the depression, is circled with a crayon marking and a series of ¼" holes, about 1" apart, is drilled along the entire length of the crayon mark.

The body tool comes with a device that resembles a screwdriver, except that in place of the usual blade there is a small chuck designed to hold a sheet metal screw. This screw device is fitted to the hole in the end of the bar and the pivot positioned about halfway between the bend and the end with the screwdriver.

Using the screwdriver handle, the sheet metal screw in the chuck is screwed far enough into one of the end holes to give it a good grip on the damaged body panel. Firm, but gradual pressure is applied to the other end of the tool arm, and the section of the panel is lifted back to its original position. The tool is moved to the next hole and the process repeated all the way across the dent.

The panel is checked again with the body file, and if necessary, the process repeated. Any remaining low spots are quickly removed by drilling another hole in the middle of the spot and lifting panel slightly.

The job is finished off by filling the holes with fibreglass body filler, along with any remaining irregularities, after which the entire repair is sanded and painted.

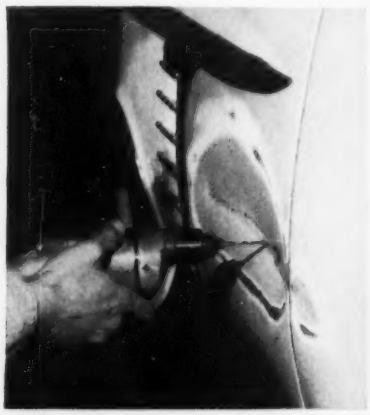
NOT A "CURE ALL"

Although the Spaulding tool certainly cannot be considered a "cure all" for body work, it is an invaluable aid to repairing minor body damage, and a real time saver when used on places like roofs, doors, fenders, trunk decks and other panels that are hard to get behind.

The Spaulding Body Tool, with neoprene suction cup installed, being used to "pop" out shallow dent in large unbraced panel.

On deeper dents or creases, filing the damaged area aids visual evaluation of damage and locates center of dent.

When center of dent has been located, a series of ¼" holes about 1" apart, is drilled along the length of the dent . . .



. . . the sheet metal screw at the end of tool is then screwed into holes and the panel is "lifted" to original contour.

Don't Let Moisture In

When servicing rear wheel bearings or axles on 1959-'60 Ramblers, the factory recommends that a bead of "Permatex" be applied to the axle tube outer flange and brake support plate contact area to prevent the possibility of moisture entering the bearing cavity and contaminating the rear wheel bearing lubricant.

In the near future, production will incorporate a gasket between the flange and brake support plate.

Say You Saw It In
Automotive Service Digest

In the automotive service business...

THERE'S NO BUSINESS LIKE CHEVROLET BUSINESS!

INDEPENDENT GARAGE OWNER:
"As a one-stop place for genuine Chevrolet parts, you sure help me save time and money."

CHEVROLET PARTS MANAGER:
"We do our best to keep a balanced parts stock. It's our way of helping you get your Chevrolet customers' cars back on the road fixed right and right on time."

Your Chevy dealer can help you keep profitable Chevy business rolling in. Here's why:

1. Over 17,000,000 Chevrolet cars and trucks on the road . . . more than any other make.
2. Your Chevrolet dealer can be your one-stop source for genuine Chevrolet parts.
3. Genuine Chevrolet parts are built of the same quality of materials and to the same rigid engineering specifications as the originals.
4. Your Chevrolet dealer can offer profit-building service aids to help you serve Chevrolet owners.

CHEVROLET DIVISION OF GENERAL MOTORS, DETROIT 2, MICHIGAN

CHEVROLET

MAKE YOUR CHEVROLET DEALER YOUR PARTNER IN SERVICE
. . . HE IS READY, WILLING AND ABLE TO SERVE YOU!

These are new *manufacturers' products*

HOW TO GET RUSH INFORMATION

If you want further information or literature describing the products shown in our "These Are New" pages, just use the handy Business Reply Card you'll find further back in this issue. Whether you want information on one or more of the products, all that is necessary is to mail this Postage paid card properly filled out to AUTOMOTIVE SERVICE DIGEST. Our Reader's Service Dept. will contact the manufacturers directly and see that you obtain the requested information as quickly as possible.

Drum Wear Safety Gauge

By using the "Drum Wear Safety Gauge," mechanics can tell in seconds whether a brake drum is safe for further machining.

Calibration marks for drum diameters of 9", 10", 11", 12", 13" and 14" are actually .060" (1/16") more than the original outside diameter

marked. Thus, the maximum safe measurement of the drum is shown at a glance. The .060" maximum is recommended by automotive associations, service manager groups, brake drum and lining manufacturers, safety organizations and parts associations.

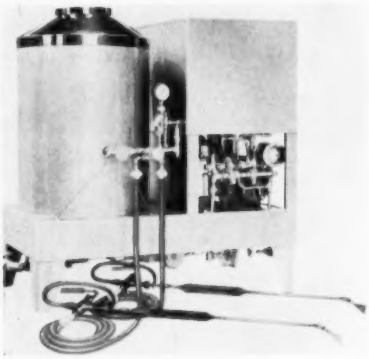
(Circle No. 1 on Reader Service Card)

Steam Cleaner

A new, fully automatic, gas-fired steam cleaner, designed especially for auto laundries and other automotive shops requiring large volumes of hot solution together with almost continuous stop-and-go operation, is announced by the Malsbary Manufacturing Co.

Because the Model 330 delivers a full 330 gallons of hot solution hourly, it often can replace 2 to 3 smaller cleaners, with resultant savings in space and fuel. The cleaner may be hooked up to automatic wheel washers or is available with one or two nozzle-controlled guns for manual operation. In either case, cleaning operations can be carried on 100 to 200 feet from the cleaner.

Solution tank of the unit holds 60



gallons, enough for 4 hours of steady cleaning. Burner is adaptable to natural gas, butane, propane, or manufactured gas. Cleaner is remarkably compact, measuring only 63" long, 36" wide, by 62" high; net weight, 1200 lbs.

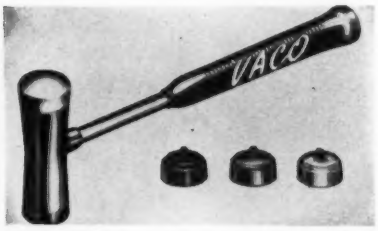
(Circle No. 2 on Reader Service Card)

Soft Face Hammer

Vaco Products Co. announces a new soft face hammer that has an overall length of 12¾" with a 4⅝" head (including tips. Furnished are three interchangeable, screw-in, replaceable tips (including nylon) that are chip-proof, flake-proof and mushroom-proof. They are 1⅜" in diameter, ⅝" thick and equipped with a plated stud that extends outward ¼".

The hammerhead is of plastic and is shot-loaded, which prevents rebound and is said to add 30% more power to the drive.

The handle shaft is of Fiberglass to



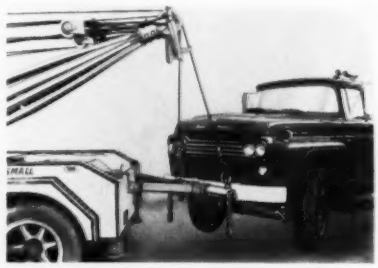
eliminate broken handles, rust, dry rot and corrosion; the cushion grip handle is shock-absorbing, non-slip and resists oil, grease and perspiration.

(Circle No. 3 on Reader Service Card)

Truck Towing Hitch

A new heavy-duty towing hitch is announced by Ernest Holmes Co. for the handling of heavy trucks, busses and trailers.

According to the manufacturer, use of the new towing hitch simplifies work in that the positioning of the wrecker to the disabled vehicle is not critical, and the hook-up for towing can easily be accomplished with considerable speed. This is made possible by heavy-duty telescopic spacer bars which automatically snap into locked position as the disabled vehicle is raised by the tow truck. When in tow,



the V-type spacer bars hold the disabled vehicle in a fixed position, thus assuring maximum security and mobility of action for towing. The disabled vehicle is forced to track per-

fectly, completely eliminating the danger of swaying or jamming into the wrecker body.

Towing from an apex behind the wrecker is said to provide a very sharp turning radius which permits the disabled vehicle to be backed into close places with the same ease as a trailer.

(Circle No. 4 on Reader Service Card)

Nylon In-Line Gas Filter

Fram Corporation's new nylon in-line gasoline filter, now being used by many auto-makers as original equipment, can be installed in any position where six inches of fuel-line tubing is available. Only special tool needed for installation is a tube cutter.

The filter is made with a nylon housing, making it lightweight, rust-proof, and resistant to vibration. Ac-

cording to Fram, benefits derived from the filter include gas savings, more power, easier starting, and fewer stalls. Such motor ills, it is claimed, are the result of dirt, metal, and rust, which get into the small carburetor orifices to cause poor valve seating and incorrect fuel-air mixtures.

(Circle No. 5 on Reader Service Card)

Electronic Tachometer

The Super Tac, recently announced by the Atomic Engineering Corp., is said to be an electronic instrument utilizing no relays or batteries, and having no direct coupling to the igni-

tion system to degrade engine performance. Further, it is stated, no calibration is required for the number of engine cylinders, voltage or battery polarity, and may be applied to any four cycle engine . . . one model will fit any spark ignition automobile or truck.

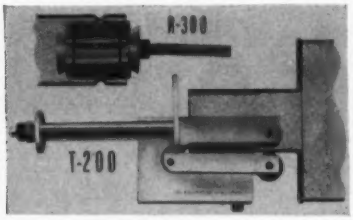
The indicator, a 3½" diameter meter, is designed to military requirements with self luminous dial and pointer.

(Circle No. 6 on Reader Service Card)

Muffler-Tailpipe Tools

Two new tools, designed to remove and reshape mufflers and tailpipes rapidly and without the use of an acetylene torch, are being offered by Power Master Sales Co.

The tailpipe removal tool (T-200) will easily separate rusted or corroded



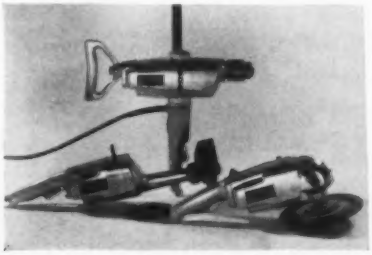
exhaust pipes from mufflers by slitting the tailpipe whether slipped over or inside the muffler. When one or two cuts have been made, it is stated that the tailpipe can be quickly collapsed so that it can be withdrawn, leaving the muffler undamaged.

The muffler pipe reshaping tool (R-300) is designed to smooth out the saddle-clamp groove often left in a muffler pipe so as to allow easy insertion of a new tailpipe. The tool will also flare out the end of the muffler pipe if necessary.

(Circle No. 7 on Reader Service Card)

New Portable Power Tool Line

A completely new line of 16 portable power tools is announced by Stanley Electric Tools, division of The Stanley Works. The line includes 10



heavy-duty drills, in a range of ½, ¾, 1, and 1¼ in. sizes; three heavy-duty disc sanders in 7 and 9 in. sizes; a 7 in. polisher and two portable grinders in 5 and 6 in. sizes.

Features of the new line: A new type fan provides extra high speed airflow through the housing for maximum ventilation, minimizes accumulation of dust and abrasives. Handles are engineered for maximum control and balance. Sealed integral trigger switches are completely self-contained, and have locking pins with finger-tip control. Exclusive "window" brush-holders reveal brush wear without removing brushes from holder.

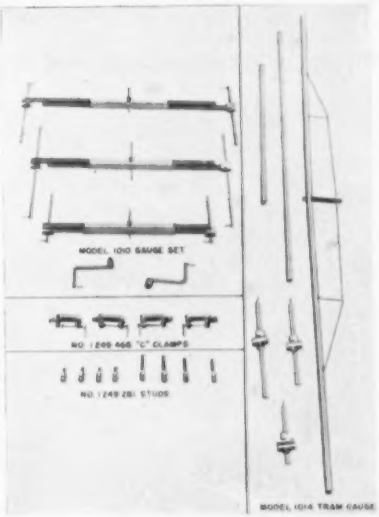
(Circle No. 8 on Reader Service Card)

Corvair Alignment Tool Set

John Bean Division's Corvair Model 1018 Gauge Set, designed for checking underbody alignment on the 1960 Corvair, consists of four components; the Model 1010 Gauge Set, Model 1014 Tram Gauge, Clamps and Studs.

The 1010 Gauge, however, is not limited to work on the Corvair; it can be used in connection with any other make of car. The set consists of three self-centering frame gauges and two offset adapters.

The Model 1014 Tram Gauge is equipped with 40", 80" and 114" bars which give moveable pointers a 12" to



114" range and a third pointer for height-comparison checks.

Studs adapt the Tram Gauge and Centering Gauges to the Corvair and "G" Clamps provide a universal attaching mount for centering gauges.

(Circle No. 9 on Reader Service Card)

Power Steering Hose Kit

A new Power Steering Hose Kit which includes everything a service shop needs to get in the fast-growing power steering line service business is

There is Only One

Aero-Seal JET

WORM DRIVE HOSE CLAMP

An original product design will always be copied, but the genuine article keeps the confidence of the user by dependability.

AERO-SEALS laugh at vibration and corrosion . . . hang on tightly . . . never shake loose or snap open. And they won't damage hose. Bands and housings are of 302-18-8 stainless steel.

No extra cost for quick-attach Jets.

Regular AERO-SEALS are also available.

Complete range of sizes from 7/16" up.

POPULAR JUNIOR ASSORTMENT

MASTER ASSORTMENT ALSO AVAILABLE

BREEZE MARK

BREEZE CORPORATIONS, INC.

700 Liberty Avenue, Union, New Jersey Cable Address: Breeze, Union, N. J.

These are new

manufacturers' products

now available from The Imperial Brass Mfg. Co.

In addition to five fast-moving hose assemblies which cover the 17 most popular applications, the kit contains Imperial's new handbook which tells what power steering trouble to watch for, gives quick checks that help spot trouble, shows how to make a power steering line change, and offers solutions to the nine most common power steering complaints. Also included is a power steering installation chart that provides step-by-step instructions —using simple diagrams—on how to handle a power steering line change, and a specification chart gives power steering line replacement numbers for all makes of automobiles. To promote this service a colorful 16½" x 28" window banner is also included.

(Circle No. 10 on Reader Service Card)

Power Brake Kits

A new line of power brake kits for the servicing of all popular cars and light trucks is announced by C. E. Niehoff & Co.

The kits provide all essential parts

for a complete power brake overhaul. Offered are six types of kits to fit Bendix, Moraine, Kelsey-Hayes and Hydrovac units as follows: hydraulic section; vacuum section; poppet replacement; and major and minor kits. Major kits contain all parts necessary for unit reconditioning except piston packing. Minor kits contain a minimum of parts most generally required. Poppet valve kits contain poppet valve parts for complete replacement.

(Circle No. 11 on Reader Service Card)

Spark Plug Viewer

The new Champion spark plug viewer with a hood molded of tough, impact-resistant Tenite butyrate plastic permits close examination of the entire interior of the insulator nose of a spark plug. In one convenient hand tool it combines a light source and a

magnifying lens, enabling mechanics to spot fouled, chipped or cracked areas inside the plug and to check the condition of electrode sparking surfaces.

The butyrate hood, which directs

the light into the spark plug, also helps protect the magnifying lens and the light bulb from damage. The viewer is powered by two flashlight batteries housed in the metal handle.

(Circle No. 12 on Reader Service Card)

Air Conditioner Leak-Detector

A low-cost leak detector kit specially designed for servicing leaks in automotive air conditioning systems has been announced by General Electric.

It includes a Type H-6 halogen leak detector that locates leaks as small as

½ ounce a year, and a new Type LS-20 leak standard for use in determining leak size. The equipment is packaged in a compact leather case for portability and protection.

The kit also includes sufficient spare parts for about one year of normal maintenance, and an instruction book describing use and repair of the equipment.

(Circle No. 13 on Reader Service Card)

Adjustable Shocks

The Adjustable "E" shock absorber, recently announced by The Gabriel Co., can be manually adjusted to provide three different degrees of damping: Regular, for normal roads or driving conditions; Firm, for extra control and stability; "Export", for maximum stability and road-hugging power.

To adjust, the shock absorber is collapsed completely and rotated to

the desired setting. It is then extended and installed in the normal manner.

(Circle No. 14 on Reader Service Card)

Transmission Jack

This new Trans-Draulic Transmission Jack, recently announced by K. R. Wilson, Inc., Arcade, N. Y., is equipped with a universal adapter that is adjustable to fit all transmissions from compacts to pick-up trucks for removing and lowering to repair or inspect and raising and holding in place while bolting into drive train.

This one-man operated jack has a lift range from 7¾" to 25½". An adjustable floating tilt provides 56° forward, 18° back and 10° right to left. The hydraulic control permits almost effortless operation during the raising and lowering of the transmission and

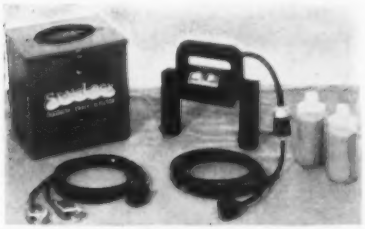
may be safely held at any distance between the maximum and minimum of the lift range. Long, wide angle tubular legs and large diameter casters assure practically tip proof and easy rolling of transmissions. The unit is ideal as a work table for holding transmission during repair operations.

(Circle No. 15 on Reader Service Card)

Magnetic Crack Detector

The Seal-Lock Magnetic Crack Detector, recently announced by The United States Casting Repair Corp., is said to be capable of detecting subsurface as well as surface cracks, flaws and defects in any ferro-magnetic metal.

The unit is completely portable, weighing only 30 lbs.; and can be operated from a normal 110-volt AC source or from an ordinary truck or auto battery. In addition, units are



available for operation from any other AC or DC voltage.

The unit is said to be ideally suited for detecting cracks in engine blocks, cylinder heads, shafts, machinery and small parts. It is easily operated by one man with no special training required.

(Circle No. 16 on Reader Service Card)

Color Matching

Increased profits, greater efficiency, and improved inventory control, are said to be available to refinishers with the recent introduction of Rinshed-Mason's Alpha-Cryl Tintometer system.

The complete system can be housed

in a compact 4' x 4' shelving unit, to hold a mere 27 base and tinting colors.

These are new *manufacturers' products*

With this limited inventory, it is said to be possible to prepare all current acrylic colors.

The Alpha-Cryl color mixing system reduces waste because it enables the painter to prepare only as much paint as he needs. This gets rid of the old headaches caused by a shop cluttered with half-filled paint cans. Further, complete control of inventory is now possible, with no obsolescence. All colors are immediately available.

(Circle No. 17 on Reader Service Card)

Single-Post Frame Lift

A new single-post frame lift with swivel arms, capable of lifting all types of passenger cars, both American and imported, and all makes and models of pick-up trucks, is announced by Weaver Mfg. Co.

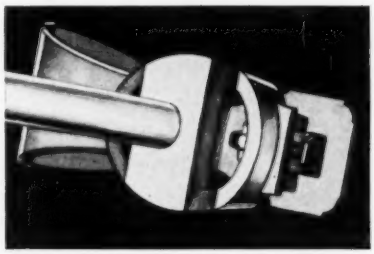
Each adjustable, swinging arm is reinforced for extra strength and equipped with a removable adjuster to provide four different height positions.

The lift is available in three models: air-oil operated, semi-hydraulic; air-oil operated, full-hydraulic; and electric-oil operated, full-hydraulic.

(Circle No. 18 on Reader Service Card)

Brake Shoe Spring Tool

A new "push-turn" brake shoe retaining spring tool is announced by Herbrand Tools, that is said to simplify the removal and installation of retaining springs. According to the manufacturer, it is the only tool available that works on leaf or "hairpin" type brake shoe retaining springs. In addition, it eases the removal and installation of coil-type brake shoe springs, thus combining two tools in one. Either way it is used, the job is



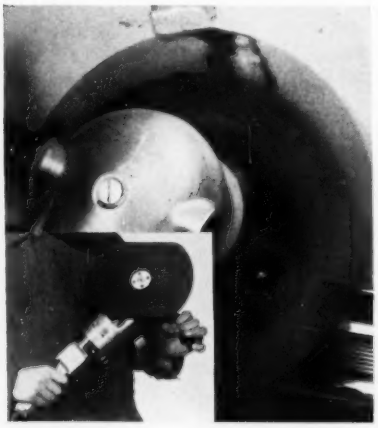
accomplished with a simple "push-turn" action. To further simplify the job, the tool has a special observation window, which permits the mechanic to see when the spring retainer is fully seated.

(Circle No. 19 on Reader Service Card)

Full-View Grinding Disc

Disc grinding can now be performed with the work-point in full view of the operator as he grinds, according to Behr-Manning Co., a division of Norton Co., who has developed a special fiber-backed abrasive disc with two parallel straight sides.

As such a "disc" rotates, a full inch at its outer edge—the area where all disc grinding is done—becomes transparent. Grinding is said to be faster because the abrasive disc need not be



moved away from the work point for frequent inspection; dwell time is reduced, according to the manufacturer, because grinding can be confined to the exact area that requires it, and contour work done with complete accuracy. And, because the actual grinding is intermittent, the metal is said to remain so cool that burning and heat distortion are practically impossible.

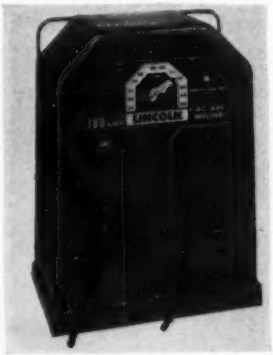
The new "Visi-Discs" are available in 7" and 9" sizes. They are surfaced with sharp-cutting Metalite, an aluminum oxide abrasive, in the standard range of grit sizes.

(Circle No. 20 on Reader Service Card)

180 Amp Welder

Purpose of the newly designed 180 amp welder, announced recently by The Lincoln Electric Co., is to make possible on-the-spot welding in even the smallest service station.

Designed with the "occasional" welder in mind, the dial type control of the new unit provides easy positive setting of the welder output over a wide amperage range. Electrodes from the smallest to 3/16" size can be used to weld materials from 20 gauge to ½" or thicker plates. The new design



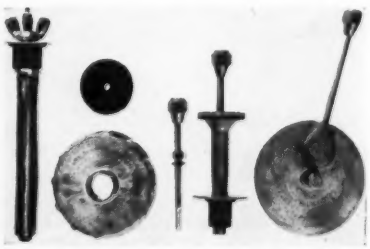
is said to have unusually stable arc characteristics and will weld mild steel, low alloy steel, and 18-8 type stainless steel. The welder comes with cables, headshield, electrode holder, ground clamp and power input connections.

(Circle No. 21 on Reader Service Card)

Brake Bleeding Adapters

A complete line of brake bleeding adapters for use with all makes of brake bleeders on 1960 cars and trucks is announced by Grigg Specialty Tools.

Shown in the illustration (from left



to right); combination air filter and air valve expanding adapter (filler plug) for use with all models of Grigg brake bleeders. This unit is said to eliminate riling of brake fluid when applying air pressure to bleeder. Next is an adapter for use on 1960 Fords, above which is an expanding adapter for all sizes of master cylinders. Next adapter is for use on 1960 Chevrolet light trucks, followed by an expanding type adapter for G.M. power brakes. On extreme right is an adapter for use on late model Chryslers.

(Circle No. 22 on Reader Service Card)

Air Pressure Valve Holders

These new Valve Holder Air Plugs, being offered by the Rich Mfg. Co., are said to make the replacing of valve springs, locks, seals and spring inserts without removing the cylinder head from the engine.

You simply remove the spark plug from the cylinder to be worked on and replace with an RMC Air Plug;

then attach air hose so pressure will build up to hold the valve in closed position.

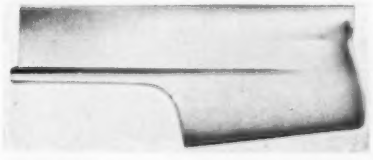
Plugs are 18 mm and 14 mm threads, standard for most spark plugs. Male connectors are interchangeable for quick coupling to various type air hose couplers.

The plugs are also useful for checking for head gasket leaks, valve leakage and worn pistons and rings.

(Circle No. 23 on Reader Service Card)

Replacement Fender Sections

A new utility fender section, the lower rear and center portion of 1955 and 1956 Ford rear fenders, is now offered by Schofield Mfg. Co. to speed up collision or rust-out damage. Available in either left or right fender styles, this die-formed section is said to require considerably less time than the cutting and welding required by other fender repair methods.

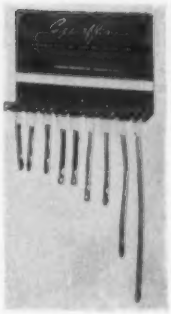


(Circle No. 24 on Reader Service Card)

Flexible Fuel Lines

A complete line of Copperflex Ever-Seal flexible fuel lines to replace original equipment hose and clamps on most 1957-60 cars is announced by Everhot Products.

Featured in the new line is the No. 109-C Dealer Display Assortment of the nine most called-for fuel lines to give the most coverage for dealers, plus colorful metal sign and rack for counter or wall display. Each line bears an individual linen no-tear label, listing Everhot part number, car manufacturer's part number, and car application data.



All brass end fittings are assembled and crimped to the lines by a heavy pressure process to assure lasting, leakproof service under severest conditions.

(Circle No. 25 on Reader Service Card)

EXPANDER CUPS
MASTER AND WHEEL CYLINDER KIT ASSORTMENT
MASTER AND WHEEL CYLINDER KIT ASSORTMENT
MASTER AND WHEEL CYLINDER ASSORTMENT
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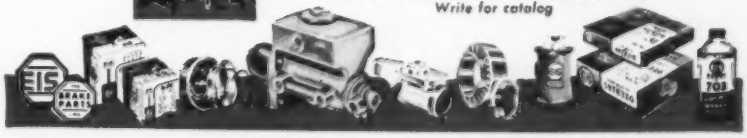
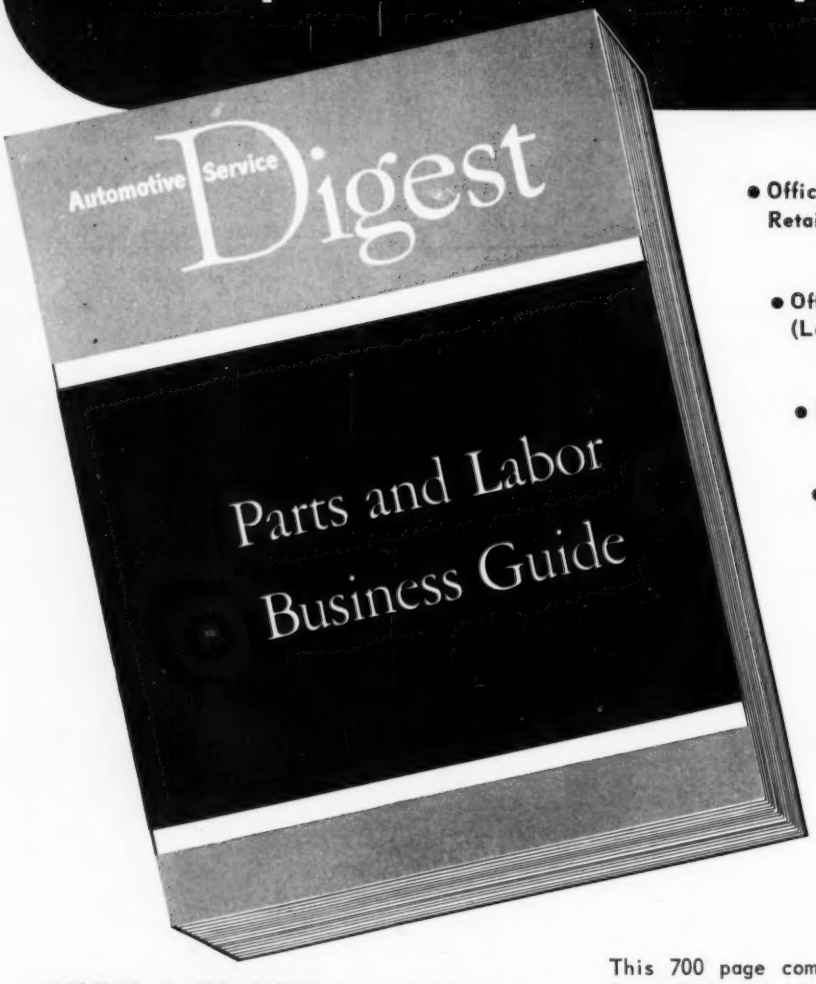


Sure profits on EVERY repair job



- Official Factory Suggested Retail Parts Prices
- Official Time Study Figures (Labor Hours)
- Estimating Procedures
- Rate Conversion Tables
- Figuring Costs
- Pricing Jobs
- Making A Profit

PRICING A JOB RIGHT is as important as doing the job right, when it comes to *getting* and *holding* business.

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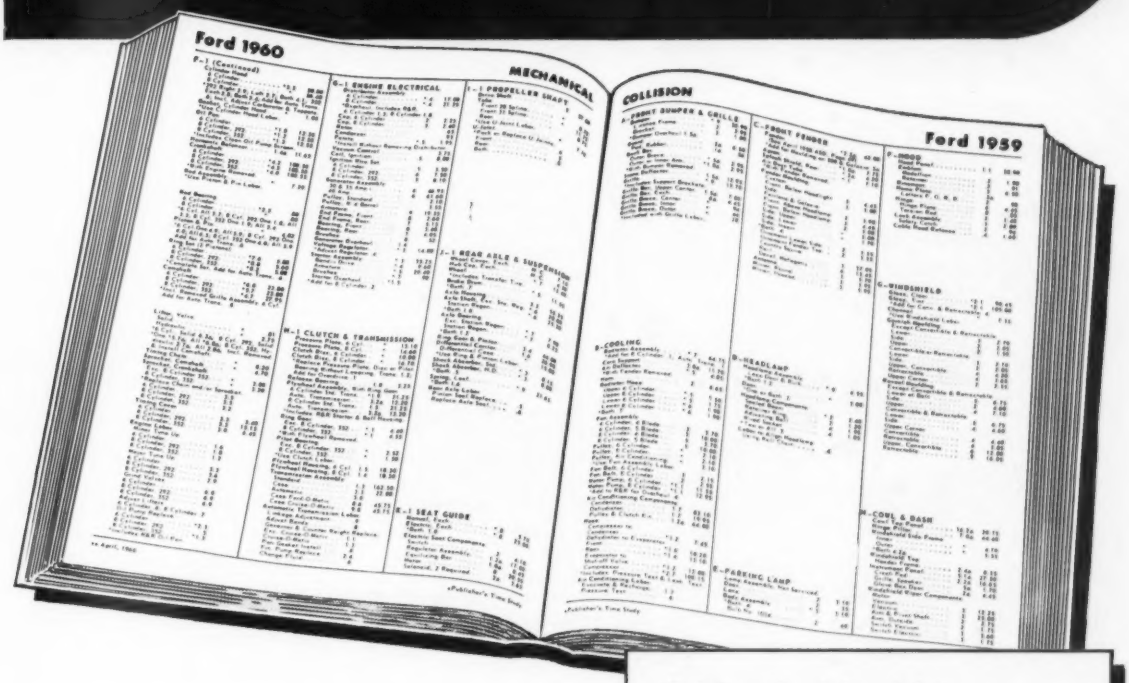

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• COVERING the "dollar sign" side of our readers' information needs, ASD "Business Know-How" articles present management subjects from the specific automotive service shop viewpoint. They are written for owners and supervisory personnel by authors of recognized business-management ability; and are based on the actual day-to-day problems of a going automotive service establishment.

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Battery Meter Aids Car Owners

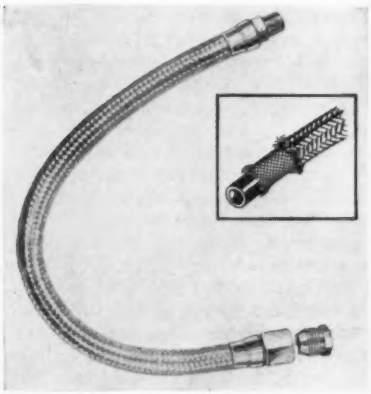
A simple, inexpensive meter made by Fox Products Co., tells motorists at a glance just how their battery is working so as to avoid the No. 1 cause of road breakdown—battery failure.

Easily installed in a few minutes in any location desired, the meter makes three tests: 1. Charge in battery—before starting to show whether or not battery needs charging. 2. Battery condition—while starting. This test, under starter load, indicates whether or not the battery needs replacement. 3. Electrical system condition—while running. This test indicates whether the amount of current flowing into the battery is low, safe or high.

(Circle No. 26 on Reader Service Card)

Replacement Fuel Lines

New custom-built, replacement fuel lines of precisioneered brass fittings, pressure bonded to a neoprene core, metal-braided hose, are announced by E. Edelmann & Co. as permanent replacements for stock hose and clamps.



According to the manufacturer, the neoprene core resists gasoline, oil and grease; double-twist woven cotton jackets not only resists wear, but is said to flex without breaking. Fittings are quick and easy to install for a gas-tight, vibration-proof seal.

(Circle No. 27 on Reader Service Card)

Synthetic Radiator Hose

A new molded synthetic rubber high-pressure radiator hose is announced by Dayton Industrial Products Co., division of Dayton Rubber Co.

Called Dayflex, and available in 22 sizes to fit 90% of the cars on the road today, the hose is precision molded around spiral-wound tempered steel wire to prevent hose collapse. The wire is completely molded in to prevent rusting, and the synthetic rubber protects against oil, grease, harsh cleansers and heat. Hose end caps are said to be "very flexible" and made extra-long for easy fit, and "sure" connections that resist cracking and breaking.

(Circle No. 28 on Reader Service Card)

13" Wheel Adapter

To permit fast, safe, balancing of the 13" compact car wheels, Hunter Engineering Co. announces a new Model

why not stock and sell the COMPLETE LINE of Carburetor Tune-Up Kits?
There's a PACCO Kit to fit most American cars, standard and compact, and all popular foreign makes.
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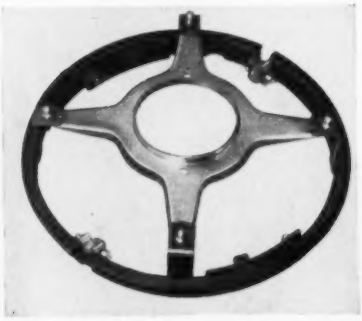
PRECISION AUTOMOTIVE COMPONENTS COMPANY
Manchester, Mo.

These are new *manufacturers' products*

127-13 Adaptor which grips the entire inner-rim circumference of the wheel. According to the manufacturer, the adaptor can be positioned and "locked" on the wheel, ready for balancing, in less than ten seconds time simply by swinging two ring-expanding, eccentric-cam levers. When properly installed it is said to be impossible for the adaptor to come off a wheel.



The adaptor is constructed of tread-gripping, shock-resistant neoprene sections pressure-molded to high-quality, tempered-steel rings and engineered for use with the Hunter Tune-In balancing instruments.

(Circle No. 29 on Reader Service Card)

Floor Maintenance "Package"

Automotive needs in the area of "housecleaning" are now being supplied in the form of a single equipment and materials package which contains a choice of floor machines and vacuum cleaners as well as cleaning solution, floor cleaner concentrate, all-purpose floor wax, applicator, cleaning pail and wringer. Each "package" also contains a 167 page, detailed "how to do it" floor maintenance manual, which also describes the five simple, basic steps in properly maintaining floors.

(Circle No. 30 on Reader Service Card)

Back Window Screen

The MoPar Division of Chrysler Motors Corp. has available a new back window screen for the 1960 Plymouth, Dodge, DeSoto and Chrysler Suburban models. The screen is also applicable to all '57, '58 and '59 Suburbans and provides desirable back window protection plus maximum ventilation.

It is designed to protect children and pets from the danger of falling through an open back window, with ample strength to discourage thievery, enabling the shopper to lock the car in warm weather and still enjoy the benefit of full window ventilation.

(Circle No. 31 on Reader Service Card)

Portable Stand with Drawers

To overcome wasted time in looking for a particular tool or gauge, Bay Products is offering a line of portable stands with locking drawers that provide protection against dirt, pilferage and unauthorized "borrowing."

Construction of stand and drawers is all steel with forest green baked enamel finish. Stands are available either in 18″ x 30″ or 24″ x 36″ tray sizes, 34″ high with four 2½″ swivel casters.

(Circle No. 32 on Reader Service Card)

"Dual-Action" Air Sander

National-Detroit's "Dual-Action" air driven sander is said to be excellent for (1) sanding prime, surfacer and putty; (2) removing rock chips and scratches in color coats without going through the prime coat and (3) sanding for repainting by removing gloss or oxidized paints.

According to the manufacturer, the "DA" does not heat the paint surface; paper does not load, and no wet sanding is necessary.

(Circle No. 33 on Reader Service Card)

Lubricant With Applicator

To eliminate contamination of greases and grease-applying brushes with dirt and other abrasive materials, which is a common problem in the lubrication of precision mechanical parts, the Alpha-Molykote Corporation has developed a special plastic jar with an applicator brush for MOLYKOTE G, its extreme pressure lubricant.

The jar of oil-resistant molded plastic, contains a supply of MOLYKOTE G lubricant in the ring section surrounding the brush storage well. A synthetic rubber washer seals the jar proper when cap is replaced and a concentric fiber washer prevents the grease from entering the brush storage well. The closed jar may be carried in any position without danger of leakage or brush contamination. The brush is securely attached to the cap and serves as a convenient brush handle. No need for hands to contact the

grease and convenience of the integral brush storage well should discourage laying it down on dirty benches or other contaminated surfaces.

This lubricant is highly recommended for threaded connections, press fittings, splines, highly loaded gears, taper sleeves, machinery wear-in, power screws, machine tool ways and guides, lathe centers and steady rests, chucks and collets and hundreds of other tough friction and wear problems.

(Circle No. 34 on Reader Service Card)

Liquid DL "395" Special Kit

A new "395" Special Package featuring two one-half gallon cans of Liquid DL Hand Cleaner to be dispensed from a dispensing pump and

wall bracket has been brought out by the DL Products company.

This waterless hand cleaner is equally effective used with or without water, contains no abrasives to irritate sensitive skins as stated by the maker and does not clog drains and has no odor. Container is easily installed so directions for use are readily readable.

(Circle No. 35 on Reader Service Card)

Pressure-Flo Bleeder Cap

The Barrett Equipment Co. offers a new Pressure-Flo Bleeder Cap for '60 Ford products. Design features include a neoprene sealing disc that covers the entire inner surface of the cap—providing for full pressure sealing of the master cylinder and tends to prevent fluid leakage caused by twisting of conventional ring type gaskets. Serrated gripping edges permit firm seating of adapter without the assistance of a wrench or pliers. Long fluid

extension tube tends to prevent fluid overflow when cap is removed from master cylinder after bleeding hydraulic system. The No. 349 Pressure-Flo Bleeder Cap is adaptable to most popular makes of bleeder tanks, as well as all models of Barrett Hydraulic Brake Bleeders.

(Circle No. 36 on Reader Service Card)

Dual Action "Air Sander"

National-Detroit's Model DA dual action sander provides a new sanding principal. It is not a disc sander. The pad is off-center and revolves free and independent of the driving head. Dual Action provides a scratch-free finish for the Acrylics, because the abrasives are traveling in a non-directional pattern, according to the manufacturer.

Dual-action eliminates the need for wet sanding, it is stated. The abrasive grains travel in a non-repeating path which does not generate heat on the surface and soften the paint. Grits as fine as #320 are effectively used without trouble from loading the abrasives.

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6. A complete range to choose from to meet every service application.

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Test new as well as used springs. Match sets of valve springs for top engine performance. Check clutch springs to prolong clutch life.

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Torque Specification Book for over 130 makes and more than 1200 models of automobiles, (U.S. and foreign) trucks, tractors, outboards, motorcycles, diesel, aircraft, marine and small air cooled engines. Spark plug, wheel bearing, valve spring data and many helpful torque tips sent free upon request, write Dept. 611.

TORQUE WRENCH
ADDISON • ILLINOIS

These are new *manufacturers' products*

The manufacturer states that DA is the "Painter's Tool," to be used in place of hand sanding on prime, surfacer and plastics and to remove gloss or oxidized paint for repainting jobs. Savings in both labor and abrasives are said to be substantial.

(Circle No. 37 on Reader Service Card)

Valve Cover Gaskets

Felt Products Manufacturing Company announces the introduction of

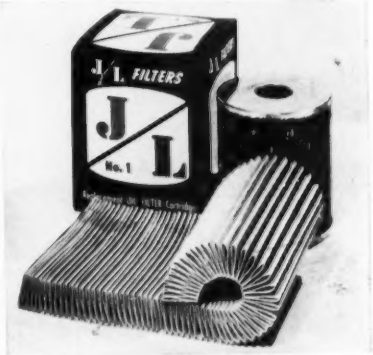
rubber valve cover gaskets, made of a synthetic rubber material designed to withstand lubricating oils and solvents. In addition its permanent flexibility assures arrival at destination in an unbroken condition and with unlimited shelf life, the maker states.

It is said that this gasket will outlast and outperform conventional gaskets. Cover distortion is reduced and disassembly is simplified because the gasket comes off in one piece. It is now available for certain popular Ford and Chrysler applications with additional coverage planned.

(Circle No. 38 on Reader Service Card)

Fullflow Air Filters

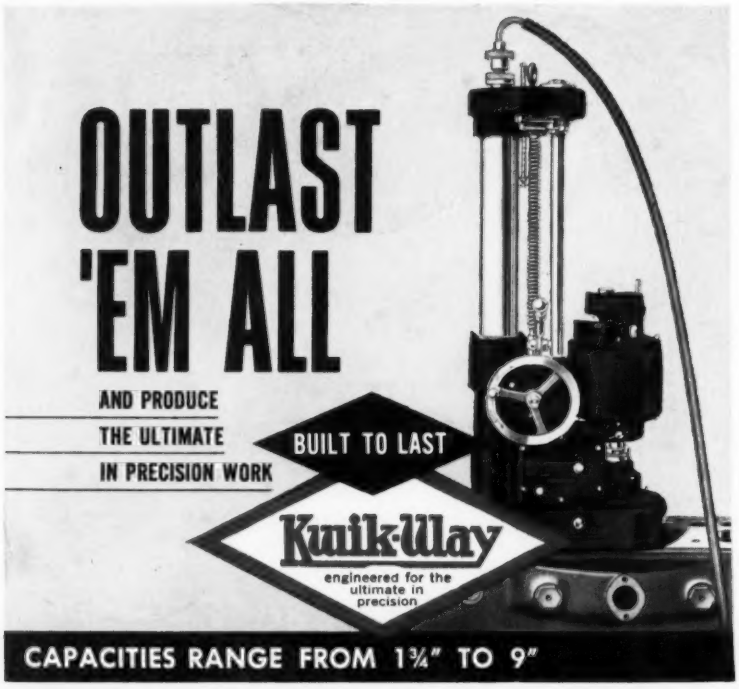
A complete new line of automotive filters has been introduced by Judd-Lederer Mfg. Co., Cincinnati, Ohio. They will be marketed under the brand name J/L Filters, as well as under private brand names. A feature of the new line is the fullflow element, which the company states is fabricated from high-quality, heat-treated



and cured filter paper by J/L's own "Unifold" pleating process. The pleating and resultant elimination of bunching and irregularities, can be noted in the illustration, which shows an element removed from a J/L replacement cartridge. This technique, plus proper filter body design, is reported to give the filters 25% or more greater filtering capacity.

(Circle No. 39 on Reader Service Card)

Kwik-Way Cylinder Boring Machines


OUTLAST 'EM ALL
AND PRODUCE THE ULTIMATE IN PRECISION WORK
BUILT TO LAST
Kwik-Way
engineered for the ultimate in precision
CAPACITIES RANGE FROM 1¾" TO 9"

In Kwik-Way's complete line, you'll find the cylinder boring machine best suited to your needs. The model FL gives you capacity from 3" to 6¾" (with extras the capacity can be increased to 9"); capacity of the model FT, shown above, is 2.630" to 5-9/32"; model FR from 2.2" to 4½" and model FX from 1¾" to 2¾".

KWIK-WAY FEATURES

- Screw Feed
- Automatic Retraction (on FL, FR, FT)
- Quick, Easy, Accurate Tool Setting
- Three Finger Centering for Accuracy
- Overhead Chip Removal With Vortex Exhausting Device (on FL, FR, FT)
- Two Speeds — Instantly Interchangeable (on FT and FR. FL Features 4 Speeds, 4 Feeds)

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Cedar Rapids, Iowa

Gentlemen:

☐ I'd like to see Kwik-Way Cylinder Boring Machines demonstrated. I understand there's no obligation.

☐ Send me further information and literature.

Name

Company Name

Address

City Zone State

(Continued from page 17)

satisfactory service. If the taper exceeds .014", the cylinder will have to be reconditioned through honing or boring. Usually the degree of work that has to be done to the cylinder to restore it to acceptable limits determines whether to hone or bore. Slightly tapered or out-of-round cylinders can usually be corrected by a fine-cut hone. Badly worn cylinders or heavily scored cylinder walls require boring to bring the cylinders back to shape. Most automotive machinists follow up a reboring job with a honing to give the cylinder wall a finely machined surface. After any honing or boring, the cylinder walls must be washed down with soapy water. **This cleaning is important, and should not be neglected.**

CHECK TIMING GEAR COVER

A seldom performed, but very important, check to be included with every good ring job includes a thorough check-out of the timing gear cover. The cover, of course, should be adequately sealed against oil loss. A good share of all oil lost out of an engine comes through poorly sealed timing gear covers. Adequate lubrication of the timing gears and/or chain is critical. A carefully controlled flow of engine lubricating oil is allowed to pass into the timing gear area at all times when the engine is running. Because the area is well splashed with oil, 100% sealing is always a problem.

A second reason for checking the timing gear, chain, cover, etc. is to make certain the gear and/or chain is not worn excessively. A chain that is worn can cause early oil consumption of an engine because it can change valve timing enough to affect engine vacuum. When this happens, excessive oil consumption is almost certain to occur. Early opening of the valves is not nearly so bad (from an oil consumption viewpoint) as late opening of the valves.

For example, when an intake valve opens late, the piston travels an increased distance on the intake stroke before the intake valve opens. This creates excessive vacuum, and sets up a condition that allows engine lubricating oil to slip past the piston rings into the combustion chambers. An excellent job of installing replacement piston rings can be ruined because of a worn timing chain or timing gears.

INSTALLING RINGS

After the correct size replacement rings have been determined, insert each ring into the cylinder in which it is to be used to check the rings for end gap. End gap is the space left between the ends of the piston rings when the ring is installed in the smallest diameter of the cylinder. End gap specifications are important. Too much gap results in poor sealing. Too little gap results in ring breakage when the ring becomes heated and expands.

To check for ring gap, place the ring in the cylinder and force it downward to the smallest diameter of the area in which the piston will travel when placed in the piston. Use the top of the piston to push the ring into the cylinder. The piston makes a convenient tool for this operation, and it will also make certain the ring is positioned at right angles to the cylinder walls. Once correctly positioned, the piston is taken out of the cylinder and the ring end gap measured with a feeler (thickness) gauge. Recommended ring gaps vary according to manufacturers' specifications. The specifications are ordinarily given on the ring package. If the end gaps are not within limits, either different rings will have to be installed, or the cylinder walls will have to be further reconditioned.

Once it's determined which size rings to install, the next step is to place the rings on their respective pistons. The latter, naturally, will be installed in the cylinders from which they were removed. Markings are usually present on the connecting rods to indicate from which cylinder each piston was removed. If the pistons were not marked originally, they should be marked with a light punch mark on top of each piston. The marks should always be placed so that they face the camshaft side of the engine when the piston is normally installed in the cylinder.

Give the piston grooves a final cleaning with a groove cleaning tool. Remove all traces of loosened varnish and carbon, and poke a small pin punch through the oil return holes of each oil groove. This will make certain the oil holes are completely open to allow oil to return to the engine crankcase after being scraped off the cylinder walls by the oil control rings.

CHECK SIDE CLEARANCE

Before actually installing the rings in the grooves, roll each ring, one at a time, into the groove so that it can be checked for side clearance. With the ring temporarily installed, measure the clearance between the side of the ring and the side of the groove with a feeler gauge. Again, ring side clearance specifications vary according to manufacturers' recommendations. Follow the specifications exactly. If the rings have too much side clearance, either thicker rings will have to be installed or the grooves reconditioned and groove inserts installed. If the ring does not have enough side clearance, ring thickness can be slightly reduced by "dressing" it down on a piece of emery cloth placed on a flat surface. Too much dressing is never recommended. It's better to get rings with the correct side clearance than it is to try to re-make an oversize ring.

When every specification is satisfied, install the rings in the piston grooves. Make certain the rings are installed with the correct side facing "UP". Most

rings are marked to indicate which side should be facing which way. Many ring manufacturers use the word, TOP to signify that the ring should be installed in the piston so that the mark is facing the top of the piston. **THIS IS EXTREMELY IMPORTANT.** Rings installed upside down just won't work right, and will necessitate a complete teardown of the engine to correct the situation.

With all rings installed on the piston, saturate the piston with clean engine oil and install a ring compressor. Tap the compressor lightly with a soft-faced hammer to be sure the rings are correctly installed in their grooves, and securely tighten the compressor. Finally, place the piston assembly in the cylinder and tap it in place with the handle end of a hammer. If the rings and the compressor were rightly installed, the piston assembly will slip into the cylinder without any chance of damage to the rings or the pistons. Repeat this installation procedure for each piston assembly.

From underneath the engine, clean each connecting rod bearing with a soft tissue and install it in place. Install the connecting rod caps and **TORQUE THEM CORRECTLY.** Install the locking nuts or the cotter pins. Clean the oil pump filter screen and replace the oil pan. Torque the pan bolts to specifications. Install the head gasket(s) and the head(s). Again, torque the head bolts or capscrews to specifications. Some manufacturers recommend placing a small pool of clean engine oil on top of each piston before the head(s) is installed. This step is always good insurance against an initial dry running of the engine, but if the piston assembly was saturated before being installed in the cylinder, the chances of a short "dry run" are almost nonexistant.

Continue buttoning up the engine until it is completely assembled. Fill the crankcase with clean engine oil (new oil filter cartridge, of course) and crank 'er up. The right kind of break-in calls for a brief running at a fast idle. Don't race the engine immediately after new rings have been installed. Give the rings a chance to get seated before the car is taken out for a road test. Once on the road, accelerate to about 50 mph. a half-dozen times to make sure everything is O.K. If the oil pressure holds up, the engine develops no unusual sounds, and acceleration seems adequate, you can assume the ring job was a success. Return the car to the shop and inform the customer to take it easy for a few hundred miles to give the new rings a chance to set up well-mated working faces with the cylinder walls, and the job is complete.

To make your shop more profitable . . . your time more valuable . . . be sure to read this month's "These Are New" section.

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LIFT ALL 4 WHEELS SAFELY

WITH ONE DELUXE AND 2 JACK STANDS

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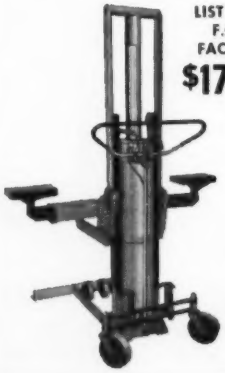

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Check Hose Position

The lower radiator hose on '59 Lincolns and Continental Mark IVs will rub against the power steering belt if the hose is installed too far onto the water pump inlet. The rubbing will wear the hose, and result in leakage. Correct positioning of the hose will allow at least half an inch of clearance between the hose and the power steering belt.

Corvair Service Hint

After installing a new set of points on the Corvair, you should check to see that the breaker plate is in its correct position. The indexed scale stamped on the plate should have the 23-deg. mark opposite the scribed line on the distributor housing. Adjust it if necessary. (*Courtesy, Standard Motor Products, Inc.*)

Valiant Battery Service

When servicing the Valiant battery, always *be sure the negative post of the battery is connected to ground.* A backwards installation of the battery could result in burning out of the alternator rectifiers. Most battery posts are clearly marked for polarity. If there is any doubt as to which post is negative, use your voltmeter across the battery posts to be sure.

Automotive Clinic . . .

(Continued from page 6)

It is true on both battery ignition and magneto ignition. Anyone can easily prove this to his own satisfaction as I will explain later, but first let's explore the reasons for some of the confusion on this subject.

It was the advent of the cathode ray type of ignition analyzer that made spark polarity widely recognized. The difference in spark polarity is dramatically shown on a cathode ray oscilloscope. The makers of these devices have rightfully drawn our attention to the importance of spark polarity, which even an inexperienced mechanic can so easily observe on an oscilloscope. But the oscilloscope itself, I believe, is responsible for some of the confusion concerning the nature of sparks. In order to explain this, let me digress for an instant.

When we speak of spark polarity, we are inclined to be fuzzy in our thinking with respect to voltage and current. You will note that at the beginning, I spoke of spark current, not voltage. If we stick with current, this whole matter will be more readily clarified. After all, a spark is current. Without current, there is no spark. Now, an oscilloscope is primarily a voltage sensitive device. Sure, you can use it to observe current too, provided sufficient precautions are taken to prevent voltage from sneaking in when you don't want it to. This is next to impossible when this extremely sensitive oscilloscope is connected to an

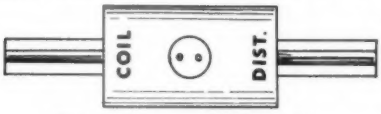

Fig. 1—Simple polarity tester.

ignition system having voltage pulses that may go as high as 25,000 volts, or even more. So, it is little wonder that we think we see some reversal of the current in the spark, when in reality we are seeing reversals or oscillations in the coil voltage.

There is a simple and accurate way to observe spark polarity and at the same time prove to yourself that the spark current goes in one direction only. Yes, we actually get D.C. out of a spark coil. Figure 1 shows a spark coil polarity tester. It consists of a neon lamp in a small housing with suitable terminals to permit its insertion into the center connection of the distributor tower, with the spark coil wire plugged into its remaining terminal. Thus, all current from the spark coil must pass through the coil polarity tester. There are two electrodes inside the neon lamp in the tester. One electrode is connected to the terminal of the tester marked "COIL," and one electrode is connected to the terminal marked "DIST." If the lamp electrode at the coil end of the lamp glows, it indicates that the negative electrons are flowing out of the spark coil, through the distributor, and across the spark plug gap to the engine block. We call this a negative spark. If the opposite electrode glows, it shows a positive spark and indicates that the primary wires to the spark coil should be reversed.

The reason for the preference of negative sparks has been explained in previous articles, but for the benefit of those who just dropped in, we will repeat it. Electrons, or negative electricity, can escape from a hot body more easily than from a cold body. In a spark plug, the center electrode is the hotter one, and if it is supplied with electrons, or negative electricity, less voltage is required to cause electrons to escape across the plug gap, in the form of a spark. At high engine speeds, the spark coil voltage tends to peter out, and sometimes the engine speed is limited to that speed at which it runs out of sparks. In such instances, making the spark negative can considerably extend the top speed capabilities of the spark coil.

In the above discussion of spark current, we have spoken only of normal conditions and normal sparks. Here is what happens when conditions are not normal. If the plug gap is too wide, or the spark coil is too weak to cause a spark, both elements of the lamp in the Coil Polarity Tester will glow. This is because, when no spark occurs, the coil voltage will oscillate, causing electrons to run back and forth in the high tension wiring, making first one and then the other electrode in the neon lamp glow. This does not happen when sparks occur because the spark absorbs the energy from the coil on its first voltage swing and the coil is too pooed out to make a voltage reversal big enough to even excite the Coil Polarity Tester, to say nothing of producing the thousands of volts required to jump a spark plug gap. If a spark plug is shorted, or if it has an abnormally short gap, sufficient energy will be available in the spark coil circuit to permit oscillation or reversal of the coil current, and such a condition will also cause both elements of the lamp in the Coil Polarity Tester to glow. So, with a simple Coil Polarity Tester, we can determine whether or not a spark coil has the preferred negative polarity, and we can also detect the abnormal and undesirable conditions of missing due to a shorted plug gap or a gap that is too wide to permit a spark to occur.—James A. Umbarger, President Fox Valley Instrument Co., Cheboygan, Mich.

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HEAT BANDS
Triple
VALVE LIFE*

RMC HEAT BAND
68,000 MILES

Note good condition of RMC Heat Band around margin and seat even though surface of head is badly eroded.

NON-BANDED VALVE
20,000 MILES

Note Failure caused by seat burning. Compare with illustration above. RMC Heat Band prevented this type of failure.

THE SOLID STEM
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RMC "Heat Banded" Valves of Bi-Metal (2 piece) construction feature Stellite faces with a Stellite band fused around the outer edge of their Austenitic (non-magnetic) steel heads. Stem diameters match sodium cooled Valves—need no special guides or installation—give maximum heat dissipation—will not seize or bind.

LOWER COST—BETTER PERFORMANCE

Heat Bands cost less than sodium Valves. Yet, they give greater performance. A trial will show you.

*Actual results achieved in a Reo Gold Comet Engine by Goethals Automotive Supply, Inc., Grand Rapids, Michigan.

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BRAKE SERVICE BULLETINS . . . As an additional service to dealers whose names have been registered with them by their distributors, Grey-Rock has announced plans to issue a series of bulletins covering brake service problems encountered by mechanics and how to overcome them. Bulletins will cover such important subjects as: fundamentals and adjustment; brake modifications made by car manufacturers; trouble shooting on late brake types; correction of brake complaints; brake troubles caused by components other than foundation brake; and other equally important subjects.

(Circle No. 40 on Reader Service Card)

FUEL FILTERS . . . A combination Capac application chart and fuel filter catalog now available from Wells Mfg. Corp. lists truck and passenger cars alphabetically by make and model, showing which Capac Filter to use for each installation.

(Circle No. 41 on Reader Service Card)

TESTING EQUIPMENT . . . A new, colorful 48-page automative test and service equipment catalog, which has been designed to take the guesswork out of equipment selection, is being offered by Sun Electric Corp. Testing equipment panels and dials are pictured in jumbo size so users can actually see the numerals on the dials, and lettering on panels. It also contains many helpful hints on how to put your Sun equipment to best use to take advantage of the booming engine service market.

(Circle No. 42 on Reader Service Card)

ENGINE POSTER . . . Muskegon Piston Ring Co. is offering installers of remanufactured engines a large new poster for showing customers, dramatically, the quality, workmanship and care, as well as the many different parts, that usually go into such an engine. The poster illustrates this through a large cutaway drawing of an engine, to the left and right of which are columns listing all the work that is normally done, plus a list of some 200 parts generally put into such an engine.

(Circle No. 43 on Reader Service Card)

LAMP SERVICE GUIDE . . . Tung-Sol's 1960 Lamp and Flasher Servicing Guide contains easy-to-find replacement specifications for 1946-'60 model domestic and European cars and trucks. Place it flat or hang it on the wall, wherever it is most convenient for you and your men. Will tell you everything you need to know for efficient lamp and flasher servicing.

(Circle No. 44 on Reader Service Card)

HYDRAULIC PRESS . . . Owatonna Tool Co's. latest bulletin (EB-9) describes and illustrates their newest hydraulic press for removing and installing equalizing beam center and end bushings on Hendrickson tandems.

(Circle No. 45 on Reader Service Card)

AIR BRAKE GUIDE . . . recently announced by World Bestos, gives detailed instructions for inspecting, testing, servicing and adjusting automotive air brake equipment. It covers 23 different types of devices regularly used in the basic air brake systems of trucks, buses and trailers. Service procedures, based on manufacturer's shop manuals, contain the latest service information available.

(Circle No. 46 on Reader Service Card)

MUFFLER SERVICE GUIDE . . . Merit Muffler's 24-page Muffler Installation Guide, which is fully illustrated and in color, contains information on general installation tips, the use of common and specialty installation tools and the various lifts and jacks used by shop men. It also contains more than 100 photos and many line illustrations depicting recommended steps and procedure for easier, quicker muffler and pipe installations.

(Circle No. 47 on Reader Service Card)

IMPORT CAR BEARINGS & SEALS . . . Latest Johnson Bronze Co. catalog (CB-59-B) has complete size and undersize information on their connecting rod bearings, main bearings, camshaft bearings, thrust washers and Weston oil seals for imported cars.

(Circle No. 48 on Reader Service Card)

BODY REPAIR PANELS . . . The latest Schofield Sco-Pan auto body repair panel catalog (C-700) lists more than 600 body panels, ranging from 1960 back to 1947 models, arranged by car make, model and year to simplify the job of finding the solution to an auto repair problem. According to the manufacturer, all Sco-Pan body panels are top quality, die-formed and tailor made for precise fit and require no cutting, forming or metalworking.

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LUBE DEPARTMENT . . . Send for the Graco Planning Kit for laying out a modern, time-saving, money-making lubrication department. Kit contains

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anytime to
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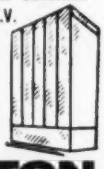
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large illustration of a bare lubrication department before any equipment is installed; accompanying card contains die-cut illustrations of all equipment necessary in a modern shop . . . you select and arrange the equipment to suit your own personal needs.

(Circle No. 50 on Reader Service Card)

STEAM CLEANERS . . . A new bulletin by Vapor Heating Corp. describes their complete line of Upgrader steam cleaners. Eight pages of details and specifications are included, covering four basic models which have capacities of 100, 200, 750 and 1500 gph of hot cleaning solution.

(Circle No. 51 on Reader Service Card)

PRECISION TOOLS . . . 48-page catalog illustrates and describes 88 new Starrett tools including new satin chrome steel tapes; master vernier height gages and calipers; many new micrometer calipers, inside micrometers, micrometer depth gages and micrometer heads; satin chrome combination sets, protractors, dividers and trammels; dial-master indicators and dial bore gages; mechanics' tools chests; and many others.

(Circle No. 52 on Reader Service Card)

BRAKE SHOES . . . A new 28-page bonded brake shoe catalog is available from World Bestos which contains complete shoe identification data and includes drilled set numbers as well as bonded shoe set numbers. Also included are bonded brake shoes and bonded shoe applications numerically listed by set numbers, and numerical listings by shoe numbers, both fully cross-referenced.

(Circle No. 53 on Reader Service Card)

GASKETS . . . Sterling Automotive Mfg. Co. is offering a new 40-page, complete-line gasket catalog (No. 59C) which lists 1200 gaskets for original equipment and standard replacement. Includes engine, transmission, differential and rear-axle gaskets for cars, tractors, buses and trucks.

(Circle No. 54 on Reader Service Card)

TORQUE TOOLS . . . Four page Apco Mossberg bulletin (#7705) contains photographs, descriptive text and specifications on its line of torque screwdrivers, deflecting beam type torque wrenches, their new style Micro-Set torque wrench, as well as specifications and information on tee handle torque tools with ratchet release at present torque, and the one or two man type double handle torque wrenches.

(Circle No. 55 on Reader Service Card)

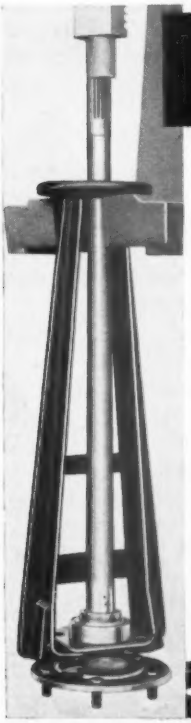
WELDING EQUIPMENT . . . 40-page manual features the full line of gas welding, cutting and allied equipment offered by Smith Welding Equipment Corp. In addition to equipment pictures and description, the manual carries charts and technical data on the various items.

(Circle No. 56 on Reader Service Card)

TOOL BITS . . . A complete line of automotive carbide tipped tool bits is shown in Klopp Engineering, Inc.'s latest catalog. The line includes: special rod, bearing and sizing cutters; boring bar cutters; brake drum tool bits and a new indexable carbide tipped brade drum cutting tool.

(Circle No. 57 on Reader Service Card)

Say You Saw It In Automotive Service Digest



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REMOVE AND INSTALL "PRESS FIT" PISTON PINS

When pins become loose just hone old rod and piston to next oversize and press in oversize pin with the Wi-To-Co Pin Fitter. It aligns piston rod, and pin for easy "straight-in" installation. Only $45.38 List Complete.

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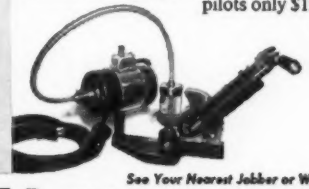

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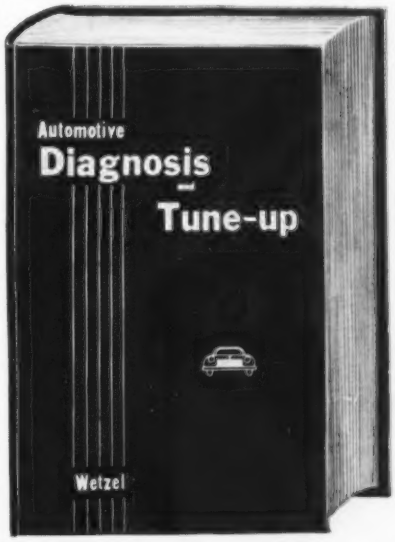

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means

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TRU-TORQUE

OTTO-ITEMS, INC.

1200 Reco Ave. St. Louis 26, Mo.

(Continued from page 21)

there will be two hexagonal sections which have to be turned in relation to each other. The correct way to separate these parts is by use of two wrenches. If only one wrench is used you are depending on the tightness of the pipe thread in the component to hold tight while the nut is being turned. If the pipe thread loosens first, the tube will turn and may easily be badly twisted. With two wrenches the part with the pipe thread can be held with one wrench while the other part is turned. No damage is done.

When putting two parts of a fitting together it is important to have the two parts exactly in line with each other. If not, they will not "catch" at all or the threads will be crossed. If the threads once become crossed either it will take considerable work and time to get the threads reworked so they will engage correctly, or new fittings must be put on. If they happen to be of the flared type this means cutting off the old flare, slipping on a new fitting part and reflaring, which takes time and is a nuisance.

It is advisable to use a tubing fitting wrench which applies force to at least five sides of the fitting, instead of a conventional open end wrench. With an open end wrench very tight fittings are liable to be distorted beyond further use. This is avoidable with a tubing fitting wrench.

When tightening fittings they must be drawn up tight enough so they will not leak but care must be used not to get them so tight that they cannot be opened up in the future, or so tight that they may be twisted off. The pipe thread on the 1/8" size is not very big and too much twisting force can shear it off.

KEEP FITTINGS ON HAND

Time is the most expensive commodity in a busy shop. Therefore conserve it by having on hand a supply of fittings. The makers of tubing fittings have assortments available enabling the shopman to make up just about any fitting or combination of fittings that may be required. Watch this stock and if any items are low or out, order them immediately.

NOMENCLATURE

There is a "nut" for each size in each type of tubing fittings. The names "tee" and "elbow" are, of course, self explanatory. A union is used to join two pieces of tubing together. With a tee, all three ends may be with tubing fitting threads or any one may be a pipe thread, depending on the connection to be made. With elbows one end may be a pipe thread.

The straight inverted flare fitting is made up of a nut and male connector. The straight S.A.E. flare fitting is made up of a nut and male connector also though the parts are reversed in that the inverted male connector has an internal thread to take the fitting nut while the S.A.E. male connector has an external or male thread to take the fitting nut.

BRUSHING UP ON THOSE

EASY-TO-FORGET THINGS

Refresher course

✔ *Cam Contour, Lift, Flank and Lobe*

• IN A FOUR-CYCLE ENGINE employing poppet type valves, the latter are lifted from their seats in the head or block by cams on the camshaft. In a cam the width of the lobe governs the number of degrees of cam rotation during which the valve is held open.

If the lobe is made wider, the nose made broader, or less pointed, it becomes obvious that the valve will be held open for a longer period of cam rotation. The actual movement of the valve, called its "lift", is determined by the distance between the base circle and the nose.

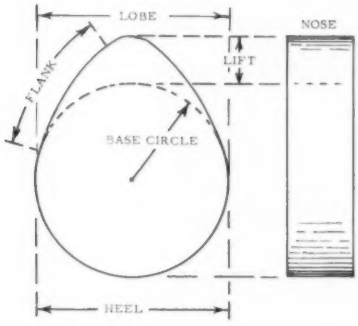


Diagram illustrating the various cam contours and common terms applied to them. Many different designs of cams are used.

The curved area from the base circle (where the valve is closed) to the nose (where the valve is wide open) is called the flank. All cam contours are specifically designed for a given type of engine. This is done so the valves open and close at exactly the right time, have the correct lift and acceleration to give top engine performance. In addition the contours are laid out to insure long life to the valve itself, as well as the valve seat.

Tool Tips *for the Mechanic*

Servicing GM 12-Volt Starters

The SNAP-ON® A-157-3 Bushing Driver and A-157-22 Adaptor can be used on GM's 12-volt starter bushings. Page 98 of SNAP-ON Catalog W tells all about them.

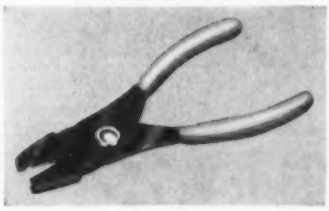
1957-1959 Chrysler Products Strut Rod Nuts

Try the R-2630 Ratcheting Boxocket® next time you work on the strut rod nut on Chrysler products for 1957 thru 1959. It's the right size and slim enough to do a quick job. See Catalog W — page 44.

1957-1959 Ford and Chevy Heat Tube

The S-8685—Manifold Heat Tube Driver works on the 1959 Ford small engines and 1959 Chevrolets, as well as 1957-58 Chevys and 1958 Fords. It's on page 68 of the catalog.

NEW TOOL



Snap-on HCP-46-BP

Small Corbin Hose-Clamp Plier

Just the right tool to speed so many jobs. Two-position, slip joint jaw openings hold the clamp in line with or at right angle to the handles.

This 6 1/16-inch plier is ideal for use on automotive hose clamps on fuel lines, outboard motors — any connection smaller than ¾-inch. A stop keeps jaws ¼-inch apart.

An 8-inch plier is available for use on ¾- to 2-inch diameter hose clamps.

Jaws are black-finished. Handles are covered with grease-resistant plastic for a comfortable grip. You can get either of these handy tools from your SNAP-ON man.

Installing 1959 Chevrolet Air Conditioning

Use SNAP-ON LHS-76 Hole Saw in your electric drill for the 2⅛-inch hole in the radiator shell. LHS-112 Hole Saw is ideal to cut the 3½-inch hole for the discharge nozzle. Page 96 of SNAP-ON catalog.

These tools are available only from your SNAP-ON man. Ask him for your copy of Catalog W — or write direct. And keep your eyes open for more Tool Tips.

SNAP-ON TOOLS CORPORATION
8035-F 28th Avenue • Kenosha, Wisconsin

(Continued from page 26)

fied by a dark streak of oil in line with the points. Lubrication is needed to prevent excessive wear between breaker cam and rubbing block on the breaker arm, but it should be an approved kind and used in a limited amount.

A trouble that is somewhat out of the ordinary has been reported several times, showing that it is always a possibility and cannot be ignored. This is a certain type of spark miss caused by poor synchronization of the vacuum advance mechanism with the movable breaker plate. In some cases the distributor breaker plate has rotated so far when making the spark advance that at the instant the spark occurs the high tension rotor is too far away from the correct contact segment in the distributor cap and the spark will jump to an adjacent segment. This is difficult to locate and can only be done by careful inspection and analysis of the vacuum advance linkage and rotor action. The correction is made by either putting a slight kink in the link from diaphragm to breaker plate, to shorten it, or cutting the link and welding a small amount of metal into it to lengthen the link. Relatively few shops know of this trouble and its correction.

The final step in working on the distributor is to time the ignition, which is done by rotating the distributor slightly one way or the other—against the direction of rotation of the rotor to advance or with the direction of rotation to retard the spark. Be sure to tighten down the clamping screw when the distributor is correctly set.

In most cases it is necessary to disconnect the distributor vacuum line before setting the timing to avoid any effect from the idle vacuum. Do not vary from the specified spark timing and under no conditions let the car owner get you to advance the spark with the idea of getting more performance or mileage per gallon of fuel. The only time there might be any variation from the factory specified timing is when the engine is power-timed on a dynamometer and then only by a thoroughly experienced operator who is familiar with the engine. Even when an engine is power timed, most of the time the timing will be right according to the factory specs.

The distributor is a precision built, sensitive, but hard-working unit. Proper, well-informed, careful service will make it perform for long periods, faithfully and well. But neglected or serviced in a haphazard manner, it can be a big headache to all concerned. The instruction manuals provided by the makers of the several distributor testers give information for testing distributors and they also supply specifications for making the various tests of the automatic and vacuum advance mechanisms. Make good use of these manuals.

Breaker Point Gap Affects Timing

Did you know that breaker point spacing affects spark timing? According to service engineers at Champion Spark Plug Co., spacing points too far apart advances timing. Conversely, points spaced too closely together retards timing.

Why? Because point spacing affects dwell angle—the number of degrees through which the distributor cam rotates while the points remain closed. When points are spaced too far apart, dwell angle is decreased, causing the points to open earlier and advancing timing. When points are spaced too closely, dwell angle is increased and the points open later . . . consequently, timing is retarded.

Harvey Jones says: "The radiator business was new to me until I opened my shop. During the first 9 months I grossed $18,000! I feel this was due to the excellence of my Inland equipment — plus the instruction and sales aids received at your school!"

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If dealer, make of car sold _____
Are you now operating a radiator dept.? ☐ Yes ☐ No

(Continued from page 51)

parking brake handle pulls out too far, proceed as follows:

1. Loosen the lock nuts on the rod attached to the equalizer lever.
2. Turn the nuts so that the cable yoke is moved forward, tightening the rear cable just enough so that the slack is removed.
3. Tighten the lock nuts securely.
4. Check tension on the front cable. If loose, turn the "half-moon" nut on the end of the cable enough to remove any slack in the cable.

(NOTE: If cables have a tendency to bind, apply lubricant.)

ROAD TEST

After completing any repairs or adjustments to the brakes, the car should be road tested. If new brake lining has been installed, it should be "broken in" gradually. A series of "panic" stops can easily ruin a new set of linings. Make a few easy stops, beginning at slow speeds and finally one or two stops at moderate speeds. Pedal free play, and pedal reserve should be noted as a final check. When parking the car, also set and check the parking brake.

(NOTE: Parking brake should be left set on, as a reminder to the customer that it has been properly adjusted and should be used at all times when the car is parked.)

SERVICE TIPS

When installing brake shoes on a car having over 10,000 miles, the wheel cylinders should always be overhauled. Otherwise, dirt and sludge which have settled in the wheel cylinder will get under the cups and eventually cause brake fluid to leak onto the linings.

All in all, Falcon engineers might well be proud of the way they designed these brakes and the way they perform. More important (to the mechanic) is the fact that Falcon brakes are a breeze on which to work. The ease of service feature is a most welcome switch to the impossible designs some engineers have whipped up in the past.

Reversing Spring-Axle Spacers Cures Propeller Shaft Vibrations

Chevrolet reports that cases have come to their attention that 1960 model P-20 (forward control) Trucks are experiencing drive line vibrations. Upon investigation, it was found the spacers between the rear springs and the axle housing mounting brackets had been improperly installed—the left hand spacer was installed on the right hand side and the right hand spacer on the left hand side. This meant that the "thick" edge of the spacers was toward the front of the truck, thus lowering the pinion nose and resulting in excessive drive line angles.

To correct this condition, remove the spacers from each side and install them on opposite sides with the "thick" edge toward the rear of the truck. In addition, the word "front" will appear on each bracket to assist shopmen when installing the spacers.

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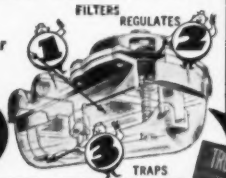

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TRY IT . . . YOU'LL LIKE IT!
GRAYMILLS CORPORATION
3736 N. LINCOLN AVE., CHICAGO 13, ILL.

(Continued from page 10)

needs of the next decade. He predicts the number of motor vehicles in the United States will reach 100 million by 1970.

* * *

Owners of the 65,000 Simca passenger cars now on American roads and all future Simca buyers are assured of parts availability, according to S. J. Wall, sales manager of MoPar, Chrysler Motors Corporation.

"We have perfected our parts inventory and ordering system and have purchased four million dollars worth of Simca parts which are now in the United States. This means that no parts and service problem for Simca owners exists today," according to Wall. Simca now has 780 dealers located in every state, who carry parts and have factory-trained mechanics.

* * *

Studebaker-Packard is going all out in the way of optional specifications. The company is featuring the idea of tailoring the car to fit individual needs from economical or performance standpoints. In carrying out this program Lark purchasers are offered a choice of 21 combinations of engines, transmissions and rear axle ratios, according to E. J. Hardig, chief engineer for the South Bend automobile manufacturer.

* * *

A nationwide series of service training sessions to better acquaint GMC dealer and fleet service personnel with overhaul and tuneup procedures for GMC Truck's V-12 gasoline engines is being launched June 1. First sessions will be in Cleveland, Ohio, and from there the program will spread to other sections of the country. Training schools will be set up in well equipped General Motors Training Centers to handle the participants.

Chattering Oil Filter

A recent Plymouth Service Bulletin reports that a chattering relief-valve type noise that is heard and felt in the crankcase oil pan originates from the type of oil filter that has eight holes in the base. This noise can be affected by turning the retaining nut on the oil pressure relief valve spring.

The condition can be corrected by replacing the eight hole filter with one having only four holes.

Leaking Rear Main Bearing

Studebaker reports that oil leakage at the rear main bearing oil seal on its 1960 models may be due to the lack of a proper drain in the rear main bearing cap—the cored drain passage may not connect with the groove.

To correct the condition, the cored drain passage should be opened to the groove by drilling and filing. Do not replace the main bearing cap.

"That mechanic of yours is mad as a hatter . . . must think he's a blacksmith. He told me my car needs new shoes."

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Calendar of Automotive Events

1960

June 23-25—IGO-California, State Annual Convention, Flamingo Hotel, Santa Rosa, Calif.

July 7-9—IGO-A National Convention, Dinkler Plaza Hotel, Atlanta, Ga.

Sept. 12-15—2nd Annual National Auto Accessory & Parts Exhibit, Las Vegas, Nev.

Oct. 24-27—1960 Fleet Maintenance Exposition, New York Coliseum, New York.

Dec. 2-9—Automotive Electric Association Annual Meeting, Edgewater Beach Hotel, Chicago, Ill.

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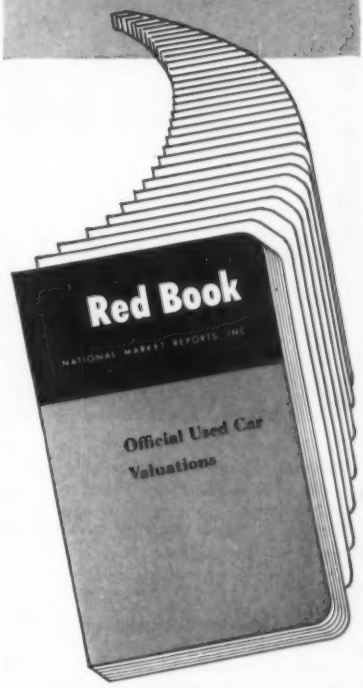

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Chicago 5, Illinois

HE WHO LAUGHS, COME WHAT MAY,

WILL LIVE TO LAUGH ANOTHER DAY

Short circuit smiles

Foreman: How come you're only carrying one sack when all the other men are carrying two?

Worker: I guess they're too lazy to make two trips like I do.

★ ★ ★

Ruthie: Do you think Bill will love me after we're married?

Uncle: Of course he will; he's always been crazy about married women.

★ ★ ★

"Any big men born around here?" asked the tourist.

"Nope," replied the native. "Best we can do is babies. Different in the city, I suppose."

★ ★ ★

Back from an evening at the amusement park with a pretty date, the freshman was extolling the virtues of the Tunnel of Love.

"Did your date enjoy it?" asked the roommate.

"I don't know. We weren't in the same boat."

★ ★ ★

A patient in a mental hospital was fishing in the wash bowl. "Catch anything?" asked an attendant, humoring the patient.

"What!" he exclaimed. "In a wash bowl? Are you crazy?"

★ ★ ★

Wife: Joe, get up. I heard a mouse squeak.
Joe: What do you want me to do, oil it?

★ ★ ★

Two farmers from Alaska were constantly arguing over who grew the largest crops. One morning the first said to his son: "Jimmy, go over to Mr. Jones and borrow his crosscut saw. Tell him I want to cut a watermelon."

Jimmy was back in a hurry. "Can't have it today," he told his dad. "Mr. Jones says his wife isn't through slicing cucumbers."

A small girl was taken to church for the first time. When everyone knelt down, she whispered: "What are they going to do?"

"They are going to say their prayers," whispered back her mother.

The child looked up in amazement; then, in a loud voice, she exclaimed:

"What, with all their clothes on?"

★ ★ ★

A small boy spat out a mouthful of too-hot food, then looked up to see all eyes at the table focused upon him. Calmly he observed: "I know some fools who would have swallowed that."

"He wants a car with a running board. What's that, Dad?"

Man: Was I here last night?

Bartender: You sure were. You ordered two rounds of drinks for the house and paid for them with a hundred dollar bill.

Man: Thank goodness. I thought I'd lost it.

★ ★ ★

"What do you do all day at the office?"

"Nothing."

"Then how do you know when you're through?"

★ ★ ★

"Your son tips me more generously than you do, sir," said the taxi driver.

"That's quite possible," replied the passenger; "he has a wealthy father—I haven't."

★ ★ ★

Two lads were discussing their cars. "What model is yours?" asked one.

"It isn't a model," replied the other. "It a horrible example."

★ ★ ★

It was a beautiful night; the moon was full, the scenery romantic. He held the lovely creature in his arms and whispered in her ear, "Darling, I love you as no one has ever loved you before."

To which she replied, "I can't see much difference."

★ ★ ★

Customer: "Could you tell me if it's raining outside?"

Waitress: "Sorry, sir, but this isn't my table."

★ ★ ★

After checking the patient over carefully, the physician asked, "Have you been living a normal life?"

"Yes, doctor," replied the patient.

"Well, you're going to have to cut it out for awhile."

★ ★ ★

Mother: "Why are you crying, Junior?"

Junior: "D-D-Daddy hit his finger with a hammer."

Mother: "Why, you needn't cry at a thing like that. Why didn't you laugh?"

Junior: "I d-d-did."

★ ★ ★

Teacher: "Johnny, this essay on 'My Mother' is just the same as your brother's."

Johnny: "Yes, ma'am. We have the same mother."

★ ★ ★

Mother: "Now, Reggie, wouldn't you like to give your bunny as a Christmas present to that poor little boy who hasn't a father?"

Reggie (clutching rabbit): "Couldn't we give him Father instead."

★ ★ ★

Boss: "This is the end. You're fired!"

Worker: "Fired!? I allus thought slaves were sold."

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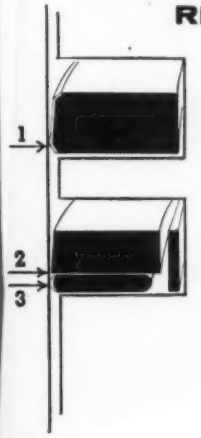
2

"OUR CUSTOMERS BUY RESULTS"



3 rings in 2 grooves give quickest seating possible. Chrome on top ring makes it shockproof, wear resistant, yet it seats the same day. Second groove features instant seating of phosphate coated cast-iron, chrome rail for oil and blow-by control.

3

"HAVEN'T HAD A SMOKER YET"

Same day seating actions of rings above — plus C-9 oil ring's side-of-groove sealing make Ramco stop pumping, smoking the day the rings are installed. Oil can't work behind C-9 to burn in chamber. Rails feature pre-seated chrome.

Ramsey Corporation, 3693 Forest Park Blvd., St. Louis 8, Missouri.
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a new
rubber valve
cover gasket
achievement

new FEL-CoPRENE

GUARANTEED
to reduce
installation time
to fit better—to seal better
to out-last and out-perform
any conventional
type gasket!

The secret of the extra resilient, longer lasting performance of new FEL-CoPRENE is the exclusive rubber formula developed by FEL-PRO in conjunction with leading car factories. This special composition rubber maintains its shape and sealing ability at higher pressures and temperatures better than conventional types. Its extra resiliency compensates for expansion—gives better conformability for all surfaces. New FEL-CoPRENE saves on installation time, too. It goes on faster because it fits right every time. FEL-CoPRENE is only available for a limited number of models right now, but you'll be able to get FEL-CoPRENE for most popular late models in the near future. Ask your FEL-PRO Jobber for the facts or write for samples and literature to: Felt Products Mfg. Co., Skokie, Ill. Since 1918.

FEL-PRO gaskets

specially designed
with your profit
uppermost in mind!

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